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NAVAL POSTGRADUATE SCHOOL
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A Combined (USN/USCG) Patrol Corvette (CPCX)

by

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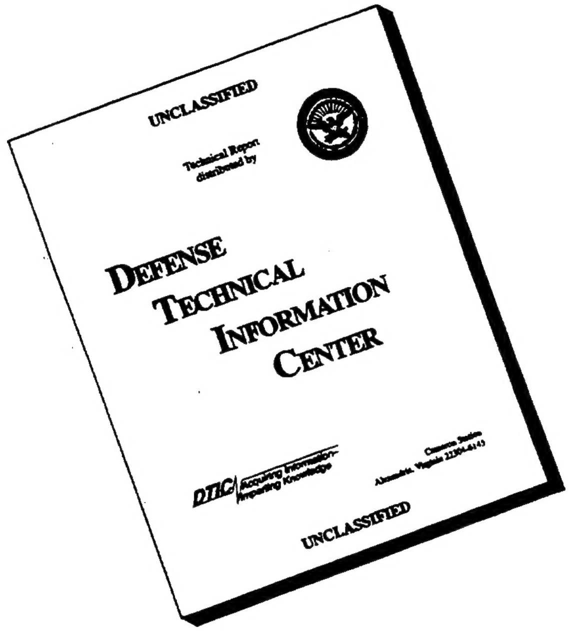

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A Systems Engineering approach to the preliminary design of a combined-usage (USN/USCG) corvette is presented. The design responds to recognition that as lawbreakers become more sophisticated and heavily-armed, the Coast Guard's law enforcement operations become more similar to warfare; and at the same time, the Navy's increasing involvement in Operations Other than War (OOW), such as sanction enforcement and humanitarian operations, is becoming more like traditional law enforcement operations. The design, responding to this situation, pursues two variants of a single basic ship -- one with a Coast Guard payload and one with a Navy combat payload. Major objectives of the design are (1) cost savings by permitting larger numbers of the ship to be built than either service, alone, would need, with a high degree of commonality between the two variants and (2) provision of the ability to rapidly reconfigure the Coast Guard variant into the Navy variant when there is an expectation of increased combatant ship needs. Mission analysis, payload selection, development of measures of effectiveness and analysis of Naval Architecture features, as well as other design factors, are addressed.

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COMBINED PATROL CORVETTE

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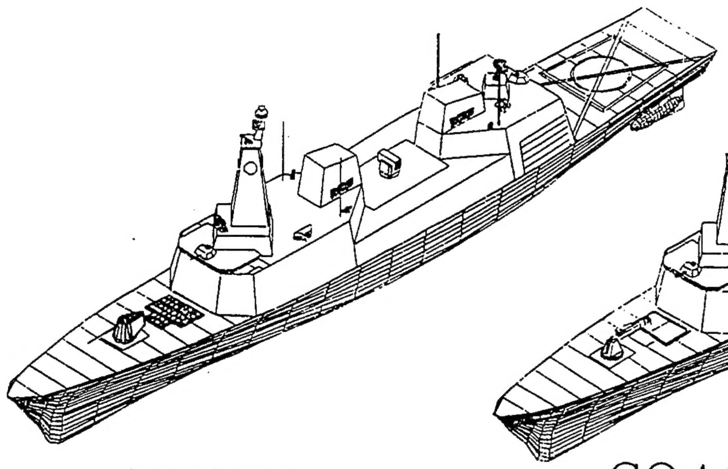

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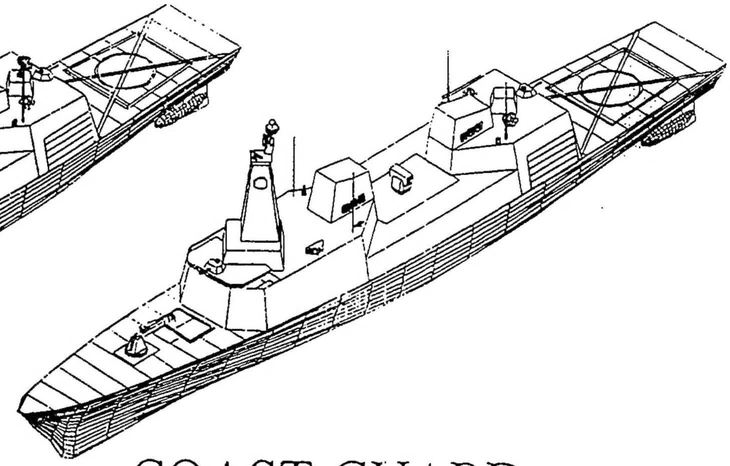

COAST GUARD

Total Ship Systems Engineering

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May 1996

The Combined Patrol Corvette (CPCX)

This report documents a Total Ship Systems Engineering capstone design project undertaken by students at the Naval Postgraduate School, under the direction of Prof. C. N. Calvano, assisted by CDR M. A. Witt, USN. The design team consisted of: LCDR Jay Renken, USN; LT Eric Anderson, USN; LT Bob Armstrong, USN; LT John Comar, USCG; LT Jim Hurley, USCG; LT Helen Kilty, USCG; LT Thomas Jean, USN and LT Bob Jones, USN. These officer students all contributed to the performance of the design project over a six month period. The present report, however, represents a significant re-work of the team's design project report, hence the listed authorship of Calvano, Witt, Anderson, Comar and Hurley.

Abstract

A Systems Engineering approach to the preliminary design of a combined-usage (USN/USCG) corvette is presented. The design responds to recognition that as lawbreakers become more sophisticated and heavily-armed, the Coast Guard's law enforcement operations become more similar to warfare; and at the same time, the Navy's increasing involvement in Operations Other than War (OOW), such as sanction enforcement and humanitarian operations, is becoming more like traditional law enforcement operations.

The design, responding to this situation, pursues two variants of a single basic ship -- one with a Coast Guard payload and one with a Navy combat payload. Major objectives of the design are (1) cost savings by permitting larger numbers of the ship to be built than either service, alone, would need, with a high degree of commonality between the two variants and (2) provision of the ability to rapidly reconfigure the Coast Guard variant into the Navy variant when there is an expectation of increased combatant ship needs. Mission analysis, payload selection, development of measures of effectiveness and analysis of Naval Architecture features, as well as other design factors, are addressed.

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I. REQUIREMENTS PHASE

A. MISSION NEED STATEMENT/FACULTY GUIDANCE

The following was provided by the faculty as guidance for this Total Ship System Engineering design project.

1. World View

The United States will continue to find itself faced with a threatening world, but one in which the nature of the threat is unpredictable. The following characteristics are expected to mark the world the U.S. must face in the timeframe 2000-2020:

(a) Major, all-out oceanic Naval warfare will remain unlikely.

(b) Regional conflicts among and between "third world" nations will be likely.

(c) International (U.N., NATO) organizations will attempt to maintain world peace and order and U.S. forces will operate under control of such organizations.

(d) Operations other than war (OOW) (trade interdiction, embargo, port closure, humanitarian relief, peacekeeping patrols, etc.) are likely employment for U.S. ships.

(e) Budgets will remain extremely tight; the lack of a clear cut threat to the existence of the United States will make it difficult to obtain defense funding.

(f) Pressures to decrease the size of the federal government and of the armed forces will continue, causing consolidations of roles for the armed forces.

(g) Proliferation of high-technology weapons among nations will continue.

(h) Law enforcement at sea (anti-drug, anti-piracy, etc.) will get more frequent and be conducted against more sophisticated and more heavily-armed criminals.

(i) The "CNN effect" will continue to make it vital to reduce the likelihood and numbers of U.S. (and even enemy) casualties.

2. Background

There has been a lengthy national debate, involving the Congress, the State Department, DOD, other Executive Branch departments and the White House. It has been decided to proceed with a ship design and procurement that has the following characteristics.

(a) There will be two variants of the ship. One will be operated by the Navy for its role in littoral operations and OOW; one will be operated by the Coast Guard in increasingly challenging law enforcement scenarios. It is noted that as the Navy does more OOW, its operations begin to look more like law enforcement; and that as the Coast Guard takes on more sophisticated and richer criminals, its operations will begin to look more like war. Hence a convergence toward a ship which can, at least in part, meet both needs has strong political attractiveness.

(b) As much as possible of the two variants will be kept the same, to reduce costs and ease production. The variants will differ where that is made necessary by their different missions.

(c) Keeping costs down is of great importance because it is intended to buy these ships in large numbers. There is a significant consensus that "small" is desirable.

(d) To keep costs down, and reduce the risk to human life, the crews are to be small as feasible for the ships' size and equipment.

(e) The ships are to use automation and other high technology approaches to make them survivable.

(f) Initial Operational Capability (IOC) is to be 2010.

3. Guidance

The following is general guidance from senior levels in the Navy and Coast Guard.

Navy Variant:

(a) Will be fully deployable and fleet-compatible. The Coast Guard version will be

capable of easily being made so.

(b) Will be operating in the presence of AEGIS combatants and, therefore, do not need an area AAW capability.

(c) Must be capable of operating effectively in the littoral environment, with specific capabilities defined by the Operational Requirements Document.

(d) Must be capable of independent as well as battlegroup operations; in the Coast Guard role, the ships will operate in one or two ship groups.

Coast Guard Variant:

(a) Must be capable of detecting, intercepting and, if necessary, defeating well-equipped drug smugglers and pirates who may have the resources to purchase significant militarized equipment. Specific capabilities will be defined in the Operational Requirements Document.

(b) Will be used to interdict illegal immigration and smuggling.

(c) Must perform search and rescue.

Conversion:

(a) It would be desirable to be able, quickly and cheaply, to convert one variant into the other, with a short (less than four weeks) shipyard availability. The design must provide for this conversion as much as is possible.

4. Amplifying Information

The Coast Guard wants a ship whose primary uses will be drug, smuggling, and illegal immigration interdiction (board and search), fisheries protection, search and rescue, escort, navigation, and survey and general maritime police duties. Low maintenance and support costs is a primary concern.

The Navy wants a robust self defense capability, some strike capability and sophisticated air search capabilities. Low observability for special operations and operations in the littoral is considered a necessity. Helicopter capabilities will be essential and multi-mission considerations are expected to govern. The ship will support amphibious operations, perform choke point clearance and function as an alternative mine hunter. Cooperative Engagement Capability and the ability to operate in the rapidly-changing littoral environment are essential. A radar that handles land clutter well without losing low/slow targets is essential.

The applications of new technologies and concepts such as interlinking ship control, administration, combat systems, C^4 I data, training and control systems are desirable. The concept of human casualty avoidance possibly through reduced crew sizes, which in turn require excellent organic training capabilities, is an important feature to be considered for incorporation into the ship system.

B. OPERATIONAL REQUIREMENTS DOCUMENT

1. Description Of Operational Capability

The system is defined as a Combined Patrol Corvette (CPCX) suitable for use by either the Coast Guard or the Navy. The ship will be required to operate in an all weather environments year-round in all oceans of the world, particularly in littoral waters. Transit of ice covered waters is not required. Two variants will be designed and each will be convertible into the other in a shipyard availability.

The Navy variant will provide independent forward presence and operate as an integral part of joint and allied maritime expeditionary warfare operations. CPCX will launch and support precision strike weapons and will provide firepower support for amphibious and other ground forces. The ship will protect itself and friendly forces against air, surface, and subsurface threats. CPCX will perform escort duties of other military and civilian craft. The ship will conduct and support special operation forces

worldwide. The ability to conduct blockade operations will be required. The ship will perform board and search operations, choke point clearance, picket and patrol duties and will function as an alternative mine hunter. The ship will maintain sea lines of communication and will protect and enforce the freedom of navigation of US and allied vessels in the navigable waters of the world. Coastal intelligence gathering will be conducted by the ship. Humanitarian assistance in the form of at sea rescues, emergency medical care, sustenance and protection will be provided. CPCX will be capable of both humanitarian evacuations and those resulting from military action. The ship will perform search and rescue (SAR) operations involving people and property.

The Coast Guard variant will primarily conduct SAR and Enforcement of Laws and Treaties operations. Humanitarian assistance in the form of at sea rescues, emergency medical care, sustenance and protection will be provided. The ship will detect, intercept, and defeat drug smugglers and pirates. It will also interdict illegal immigration and smuggling. Fisheries protection, escort, safety of navigation, survey, and general maritime police duties will be carried out by the Coast Guard variant. Coastal intelligence gathering will be conducted by the ship. Port security duties in the form of searching and boarding vessels will be performed. The ship will carry and station small navigational buoys. The ship will assist in the containment of oil spills. The Coast Guard variant will be capable of joining the Naval fleet in joint operations and in time of war.

2. *Threat Summary*

While traits of projected threats cannot be predicted exactly, reasonable threat estimates can be made by identifying projected threat environments, extrapolating data from current weapon systems, and examining possible technologies for future weapon systems.

Major all-out oceanic warfare will remain unlikely while regional conflicts among and between third world nations will occur. Limited warfare in the littorals requires different resources than currently exist. Operations other than war such as trade

interdiction, embargo, port closure, humanitarian relief, and peacekeeping are expected. Proliferation of high technology weapons among nations will continue. Encountering more sophisticated and heavily armed criminals will be commonplace.

Future weapon systems include missile threats that, when compared to today's weapon systems, will be smaller, faster, capable of flying at lower or higher altitudes, will have smaller radar cross sections, and improved targeting and avoidance systems. Gun threats include guided as well as unguided projectiles that will be challenging to detect, engage, and defeat. Threats will also include combined arms attacks intent on eroding ship self-defenses and removing offensive capabilities.

Specific projected threats categorized by threat environments are as follows:

(1) Law Enforcement (Independent operations - ship operating independently in littoral waters):

Small arms	- 20 mm and smaller bullets (armor piercing).
Projected grenades	- 40 mm explosive and chemical.
Mortar	- 80 mm explosive and chemical.
Guns	- 76 mm, 20 km range.
Missiles	- Mach 2.0, -40 dB, 3 km range.

(2) Low Intensity Conflict (Independent and Group operations - ship(s) operating jointly in littoral waters):

Small arms	- 20 mm and smaller bullets (armor piercing).
Projected grenades	- 40 mm explosive and chemical.
Mortar	- 80 mm explosive and chemical.
Guns	- 76 mm, 20 km range.
	- 127 mm, 28 km range.
Missiles	- Various flight profiles
	- Mach 2.0, -40 dB, 3 km range.
	- Mach 3.0, -35 dB, 100 km range.
	- Mach 1.5, -30 dB, 200 km range.

Mines	- Bottom or moored, -25 dB.
Torpedoes	- 100 knots, -30 dB, 7.5 km range.

(3) Major Regional Conflict (Force operations - operating as a junior member of an amphibious or carrier battle group task force in littoral or deep waters).

Guns	- 76 mm, 20 km range.
	- 127 mm (unguided), 30 km range.
	- 127 mm (guided), 30 km range.
ETC guns	- 127 mm (rocket assisted), 110 km range.
Missiles	- Various flight profiles
	- Mach 2.0, -40 dB, 3 km range, dual mode seeker.
	- Mach 3.0, -35 dB, 100 km range.
	- Mach 1.5, -30 dB, 200 km range, dual mode seeker.
	- Mach 4.0, -20 dB, 700 km range.
Mines	- Bottom or moored, -25 dB.
Torpedoes	- 100 knots, -30 dB, 7.5 km range.

3. Shortcomings Of Existing Systems

Current ship designs are inadequate to meet the needs of the Navy and Coast Guard into the 21st century. Existing ship designs such as the Navy's Spruance, Kidd and Perry classes and the Coast Guard's Hamilton, Reliance and Bear class cutters will reach the end of service life before the year 2010. A new surface combatant is necessary to maintain the required surface combatant force level capable of countering the 2010 and beyond threat.

Present ship designs were built for open ocean battle group operations, with strong steady logistic support, and defense in depth. These ships were not designed to operate for extended periods far from the strength and support of the battle group. Our current

fleet is being taxed by the need to provide global forward presence in littoral waters with limited numbers of ships.

Present designs employ an inflexible architecture that prevents timely and cost effective updates and reconfigurations. Shortfalls include obsolete computers and software, with the inability to introduce subsystems into an effective total ship system. These shortfalls make current designs vulnerable to threats from advanced aircraft, small fast surface craft, mobile and fixed land-based weapon systems, and submarines.

Current designs have large manning requirements but have inadequate ship self-defense systems to protect the ship and its crew from close in attack. Shortfalls in accuracy, reaction time, target discrimination, and kill assessment create vulnerabilities. Mines and diesel submarines are cheap, viable threats that must be countered. Present ships have no mine avoidance capability and their active and passive sonar systems are designed for open ocean operations. They are vulnerable to attack from mines, torpedoes, and anti-ship missiles making them "*littorally challenged*."

4. Range Of Capabilities Required

BOTH VARIANTS

CPCX must be able to operate independently in its patrol area. The ship must be fully interoperable with other Naval expeditionary, interagency, joint and allied forces. The ship must maneuver in formation at sustained Naval expeditionary force speeds in excess of 25 knots (kts). The ship will have a minimum range of 8000 nautical miles (nm) at a cruise speed of 14 kts. The ship must be able to perform seamanship, airmanship, and navigation tasks and to prevent and control damage. Underway fueling at sea capability is required as well as the ability to provide fuel to an astern rig. The ship must be able to embark and support armed rotary-wing aircraft, and conduct rotary-wing aircraft operations. The ability to stop, board and disable other vessels is required. CPCX will have a reduced electronic, magnetic, thermal, and acoustic signature to achieve low observability. A sensor suite able to operate in both open ocean and close to land with

minimal detection degradation is required. The communications suite must have an integrated database capable of interfacing in a Joint Task Force/Combined Task Force (JTF/CTF) environment to include compatibility with joint systems such as the Global Command and Control System (GCCS) and the Joint Worldwide Intelligence Communications System (JWICS). The ship must have a full suite of radios and antennas to support full connectivity via EHF/SHF/UHF/SATCOM. The ship must be able to support the equipment and personnel of a mine disposal system. Weather deck connections for temporary sewage and sanitation facilities must be provided. In water personnel rescue is required from the ship. The ship will be capable of providing routine health care, first aid assistance, triage, and resuscitation, to include care of evacuees numbering 50% of crew size. Towing capability is needed for seized vessels up to 10,000 LT displacement. Multi-purpose ship's small boats will be readily deployable, have a minimum capacity of 8 people, and be able to perform in waters up to sea state 4. Modularized mission specific items for future updates will be used and will lend toward quick conversion between variants. Minimization of crew size while maintaining capability is essential.

NAVY VARIANT

The ship must destroy or neutralize enemy targets afloat and ashore through the use of coordinated, precision strike weapons. The ship must be capable of performing ship self defense against foreign military enemies and civilian terrorists at sea and in port. The ship must be capable of conducting engagements cooperatively with other ships, submarines, aircraft, space systems, and land systems. The ship must detect and chart underwater mines. The ship must detect, identify, and engage air, surface, and underwater threats. The ship must capable of defending itself against raids comprised of 3 ASCMs arriving within a one minute interval.

COAST GUARD VARIANT

The ship must destroy or neutralize enemy targets afloat and ashore. The ship must be capable of performing ship self defense against foreign military enemies and

civilian terrorists at sea and in port. The ship must be capable of conducting engagements with other ships, military and civilian aircraft, and land systems. The ship must detect and chart underwater mines. The ship must detect, identify, and engage air and surface threats. Capability to transport and station small navigational buoys is required. A system for prisoner containment will be provided.

5. *Integrated Logistic Support (ILS)*

The ultimate goal of the logistic support system will be to develop a "paperless" ship, one that is able to devote 100% of its personnel and equipment to its assigned missions. The CPCX will be designed with a squadron type basing system. This will simplify the logistic support planning and requirements.

Maintenance Planning: The CPCX will incorporate minimum-manning concepts wherever possible. The onboard crews will be expected to perform routine, recurring minor maintenance (less than 3 hours per individual task) and casualty repairs while underway. Shore based Maintenance Augmentation Teams (MAT) will assist the ship's force with non-depot level maintenance and repairs while the CPCX is in port. MATs shall incorporate both contract and government personnel. The maintenance philosophy will consist of the Preventative Maintenance System (PMS) and Condition Based Maintenance System (CBMS). CBMS shall be implemented to the greatest extent possible using the technology available.

Depot level repair: Systems shall be designed for extended cycles between depot level availabilities. A 5 year drydocking cycle with one pierside availability near the halfway point shall be the minimum major maintenance intervals.

Support Equipment: All combat and HM&E systems shall include built-in diagnostic capabilities to reduce troubleshooting man-hours. Artificial intelligence driven trouble-shooting systems are to be included with all combat and HM&E systems. Tools required for onboard maintenance and repair shall be available on CPCX. This shall

include a small machine shop for emergency repair (underway) functions. The use of special tools required for maintenance and repair shall be minimized.

Human Systems Integration: The use of minimum-manning requires each crewmember to be trained for multiple skills. Pipeline and/or squadron training facilities shall be utilized to reduce on-the-job training (OJT) requirements for primary skills. This will enable OJT to be utilized for cross-training. Combat systems and HM&E systems (to the greatest extent possible) shall incorporate individual and team training functions without external support.

Computer Resources: Software shall be written using existing languages with code length and storage requirements minimized to the greatest extent possible. Hardware shall consist of militarized Commercial-Off-the-Shelf (COTS) equipment wherever possible, militarized only as required. Components chosen shall be open systems compliant.

Other Logistic Considerations: Provisioning shall be consistent with current Navy/Coast Guard policy at the time of implementation. Home port piers shall be designed to moor at least one half of a six-ship squadron at all times. Adequate office space shall be provided for squadron staff, consistent with the goals of this system, the "paperless ship".

6. Infrastructure Support and Interoperability

The CPCX shall be designed as a squadron supported ship. It will be based in large groups (6 or more). The CPCX will depend on its squadron staff for the bulk of its administration, maintenance, planning, contracting, supply, training ,and personnel functions thereby minimizing manning requirements on the ships.

The CPCX shall be designed with standardization (within ship class) as a priority. The ability for a rapid reconfiguration between the Navy and Coast Guard variants is desired. Commonality with existing US and NATO systems to the greatest extent possible is highly desired.

7. Force Structure

The introduction of a corvette sized hull with modular combat systems suitable for mission tailoring for combined Navy and Coast Guard use would require a change in the mindset of ship-counters. These combined service corvettes are not suited to be one for one replacements for ships of the line such as DDG-51 class destroyers and CG-47 class cruisers and will not be expected to fulfill all the missions of an Aegis fleet. CPCX cannot be viewed as one for one replacements for the DD-693 and FFG-7 classes because of differences in the types of missions required in the littoral regions of the world.

Although the CPCX would not be a direct replacement for current combatants, ship class life cycle comparisons provide a basis for the future force structure. In 2005 the DD-963 hull will have completed 30 years of service and will be nearing the retirement phase of the Spruance and Kidd Classes (35 hulls 1200 officers, 11,100 crew). In 2007 the FFG-7 will have completed 30 years of service and will be nearing the retirement phase of the Oliver Hazard Perry Class (51 hulls, 1000 officers, 10,000 crew). In 2013 the CG-47 will have completed 30 years of service and will either be upgraded to extend their life cycle or begin the retirement phase of the Ticonderoga Class (27 hulls, 900 officers, 10,000 crew). In 2011 the DDG-51 will have been in service for 20 years and will still have at least 10 years of service remaining for the Burke Class (28 hulls, 644 officers, 7,840 crew). With the retirement of the non-Aegis ships and the high cost of the Aegis platforms, the CPCX would be ideally suited to perform independent or small group operations in the littorals or support battle group or amphibious group operations.

In view of this information, the integration of the CPCX into the Navy should be in proportion to the number of major combatants in service which would include aircraft carriers, large deck amphibious ships (LHD's, LHA's, and LPD's), cruisers and destroyers. It is estimated that the future major combatant fleet size in 2010 will be approximately 120 hulls. In consideration of the future fleet size, a two one ratio of major combatants to the CPCX is appropriate. This will result in 60 CPCX hulls for Navy use.

The Coast Guard's need for a new ship class is more pressing than the Navy's need. The Coast Guard's ships are older, and therefore will require a significantly higher percentage of maintenance and financial resources. In 1997 the WHEC-715 hull (Hamilton class 378 ft HEC) will have completed 30 years of service (12 hulls 250 officers, 1,870 crew). All twelve hulls were modernized between 1988 and 1992 and the class can be expected to be operational for a 40 year hull life. In 1994 the WMEC-615 hull (Reliance class 210 ft MEC) will have completed 30 years of service (16 hulls 130 officers, 870 crew). All sixteen hulls where modernized between 1989 and 1994 and the class can be expected to be operational for a 40 year hull life. In 2013 the WMEC-901 hull (Bear class 270 ft MEC) will have completed 30 years of service (13 hulls 143 officers, 1365 crew). Service life could easily be extended to 35 years with proper maintenance and planning. In view of the age and time in service of the above classes it is proposed that they be replaced by the CPCX as the new hulls become available. The current Coast Guard force would be replace by 40 CPCX's.

The production strategy for CPCX is to construct two hulls (one Navy variant, one Coast Guard variant) in 2009 for acceptance trials and testing resulting in delivery in 2010. A second hull of each variant will be produced by the same yard or yards the following year to validate production processes prior to commencing full production of the class. It is expected that the production run will last between 10 and 15 years. A total of 100 ships would be built resulting in the construction of 7 to 10 hulls per year. The first five years of production should be 8 units per year divided 5-3 in favor of the Coast Guard. This will help alleviate financial and manning strains on the Coast Guard and will help to keep production costs down in the early part of the production run. After five years the number of hulls constructed will be 25 Coast Guard variants and 15 Navy variants. The second five years of production should continue at 8 units per year in a 6-2 split in favor of the Navy. This will allow continued modernization of the Coast Guard fleet and timely retirement of non-Aegis combatants. After ten years the number of hulls constructed will be 35 Coast Guard variants and 45 Navy variants. The last five years of production will complete the production run with 4 hulls per year and a 3-1 split between Navy and Coast Guard. The total number of hulls constructed will be 40 Coast Guard variants and 60

Navy variants. A replacement for Aegis platforms will probably start production around the year 2020 reducing the funds available for the CPCX program.

8. Schedule Considerations

The ship will be considered fully operational after acceptance trials, and completion of Post-Shakedown Availability (PSA), as well as having all support and maintenance facilities in place and operable.

A projected timeline for design and production processes is as follows:

Present - 2002	Feasibility studies and Preliminary Design
2003	Contract Design
2004	Bid process
2005	Award contract
2006	Detail Design and begin construction
2010	Deliver First ship (testing and PSA complete)
	Every 5 years review and update design
2025	End production
2050	Begin decommissioning

The ships crew and squadron will stand up approximately one year prior to delivery to begin the precommisioning process. All personnel required to attend critical rate schools prior to reporting will complete training pipelines no less than 6 months prior to ship delivery. The remaining period prior to delivery will be used for on the job training, team trainers, and training with mockups or with actual shipboard equipment when possible.

Shore based maintenance and logistics facilities and systems will be in place 6 months to a year prior to ship delivery.

9. Cost Considerations

Cost is one of the primary factors concerning the design of this class of ship. The high costs of current combatants preclude their use to satisfy the mission defined for the littoral regions. The CPCX must be a more cost effective system for dealing with littoral warfare. The missions required of this ship will dictate that ship self defense will be of the highest priority. This along with the desire to automate systems while maintaining a robust ship self defense capability will tend to increase the acquisition costs. Reduced manning, however, should lead to lower operational costs and fewer potential personnel casualties. In view of these points it is intended that this ship type will be significantly less expensive than the current Aegis platforms being constructed. The ship price (averaged over the production run) may not exceed $450 Million (Navy variant) or $375 Million (CG variant), 1995 dollars. The displacement may not exceed 4000 LT (either variant).

II. FEASIBILITY STUDY/COMBAT SYSTEM SELECTION

A. INTRODUCTION

The design team was given the task of designing two separate ships, one Navy Variant and one Coast Guard Variant. Each variant must be easily convertible into the other, meet the design constraints in terms of weight and cost, and satisfy the requirements as defined by the Operational Requirements Document (ORD). The team divided into two sub-teams: a U.S. Navy team, and a U.S. Coast Guard team, with each team consisting of both Navy and Coast Guard members. The following chapter outlines the feasibility study which was conducted to measure the suitability of the CPCX design for service in the Navy and Coast Guard.

The first task was to develop "threat scenarios" based on expected future threats. While the traits of future threats cannot be projected exactly, reasonable threat estimates can be determined by identifying projected threat environments, extrapolating data from current weapon systems, and examining possible technologies for future weapon systems. The expected threats were broken down into service specific threat scenarios. A threat level and opportunity analysis was done to assist in prioritizing the emphasis on specific warfare areas for each design. These threat scenarios are included in Appendix (A).

The design constraints, specific design requirements, and projected threat summary provided the bases for the Combat System selection. The following sections provide a detailed analysis of the Combat System selection process including: Combat System elements considered, method of element selection, trade-off studies, option analysis, measures of effectiveness, and final design recommendations.

B. COMBAT SYSTEM REQUIREMENTS

The requirements set forth in the ORD were reduced to reflect requirements which pertained to Combat Systems and separated into three areas; common requirements for both variants, Navy specific requirements, and Coast Guard specific requirements. These Combat Systems requirements are included in Appendix (B).

C. FUNCTIONAL ALLOCATION

A functional allocation table was developed to link each operational requirement to a specific warfare area and functional area. The Combat System requirements listed in Appendix (B) were broken down into functional and warfare areas. Functional areas include: Detection, Control and Engagement. The warfare areas include: Anti-Air Warfare (AAW), Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASuW), Mine Warfare (MIW), Strike Warfare, Amphibious Warfare (AMW), Enforcement of Laws and Treaties (ELT), Search and Rescue (SAR), and Other Than Warfare (OTW). These nine warfare areas are a subset of each functional area which linked each specific requirement in the ORD to a warfare and functional area. Table (1) contains an example of a functional allocation table. Under each warfare area, The functional allocation tables were used as a tool to ensure all requirements are satisfied and each warfare function will be performed by at least one element in the Combat System suite.

D. COMBAT SYSTEM ELEMENTS

The threat scenarios and functional analysis guided the team toward general Combat System areas. Six warfare/Combat System areas were investigated: Guns, ASW sonars, air/surface search sensors, missiles, mine hunting devices, and small boats. These investigations were conducted by two-person "mini"-teams (consisting of one member from each parent team). The mini-teams compiled lists of data on existing systems and systems under development. The lists for some of the sensor and engagement systems are included in Appendix (C). This raw data was examined and used to evaluate the identified systems in terms of performance, ship impact, cost, and convertibility. A detailed system trade-off study was conducted in two areas: sonar and air search radars.

E. TRADE-OFF STUDY: SONAR

Sonar selection for the CPCX was a difficult problem. The Navy obviously needed some sort of active sonar but the Coast Guard did not want a sonar system. The desire to use the same hull for both variants and the difficulties of installing or removing a hull mounted sonar drove the selection toward a smaller hull mounted system or some sort of

Elements	AAW						ASW				ASUW					
	Vol Search	ESM	IR	Visual	Organic	Inorganic	Active	Passive	Organic	Inorganic	Surf Search	ESM	IR	Visual	Organic	Inorganic
Oper. Requirements																
A1																
A2	X	X	X	X	X		X	X	X		X	X	X	X	X	
A3																
A4											X	X	X	X	X	
A5					X				X						X	
A6					X				X						X	
A7																
A8	X	X	X	X	X		X	X	X		X	X	X	X	X	
A9																
A10																
A11																
A12																
A13																
B1																
B2																
B3	X	X	X	X	X		X	X	X		X	X	X	X	X	
B4	X	X	X	X	X		X	X	X		X	X	X	X	X	
B5	X	X	X	X	X											
B6	X	X	X	X	X		X	X	X		X	X	X	X	X	
B7																

Elements	MIW			STW		AMW			ELT						
	Ship Board	Organic	Inorganic	Organic	Inorganic	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
Oper. Requirements															
A1															
A2									X	X	X	X	X	X	
A3															
A4									X	X	X	X	X	X	
A5				X			X							X	
A6				X			X							X	
A7															
A8	X								X	X	X	X	X	X	
A9															
A10	X	X													
A11															
A12															
A13															
B1				X											
B2						X	X								
B3															
B4															
B5															
B6															
B7	X	X													

Elements	SAR							OTW						
	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
Oper. Requirements														
A1														
A2	X	X	X	X	X	X		X	X	X	X	X	X	
A3														
A4														
A5						X							X	
A6						X							X	
A7	X	X	X	X	X	X		X	X	X	X	X	X	
A8	X	X	X	X	X	X		X	X	X	X	X	X	
A9														
A10														
A11														
A12														
A13														
B1														
B2														
B3														
B4														
B5														
B6														
B7														

Table 1 - Functional Allocation, Detection, Navy

removable system. With this logic in mind two major options were selected for the active sonar system. The hull mounted SQS-56 and an active towed array system called ATAS.

To analyze the active capabilities of the two systems a sample detection scenario was used and range detection predictions were calculated. The target of interest was a submarine with a Target Strength of 15 dB, at a depth of 150 meters in water 2000 meters deep. Assumptions made for the analysis included 50% probability of detection and straight ray path propagation. It was realized that the constant velocity sound propagation is not realistic but this was the best tool available for analysis. Actual propagation paths will be addressed in the discussion of the system selected. Factors considered in the calculation included; spreading losses, reverberation, ambient noise levels, array characteristics, power level, and geometry. The calculation spread sheets are included as Appendix (D) . The Signal Excess for the SQS-56 system is positive to a range of 30,000 meters while the Signal Excess for the ATAS is positive in excess of 40,000 meters.

The ranges from the sonar analysis are not important in themselves, but they do show that the ATAS outperforms the SQS-56. Another factor not considered in the model was self noise. The towed array system would see much less self noise than the hull mounted system which would improve the towed array's performance relative to the hull system. Another major consideration for the selection is the effect of velocity profile on prediction ranges. Because the propagation paths will not be straight, both systems should experience performance degradation. The degradation of the hull mounted system performance should be much greater than that of the towed array system because the hull mounted system operates above the surface layer while the towed system has the capability to be lowered to a depth of 300 meters. Based on this sonar analysis, the ATAS has better performance characteristics.

F. TRADE-OFF STUDY: RADAR

A table of detection ranges for various radars against the incoming threat missiles was created. To analyze radar performance, the characteristics of each radar were entered into known radar equations to compute signal excess versus range plots. From the signal

excess plots and the radar cross section (RCS) of each threat missile, the maximum detectable range can be found. The table of detection ranges is located in Appendix (E).

The comparison of radar characteristics shows that a radar such as a SPY-1D with 5 MW of peak power has the longest detection range and can detect an incoming missile at the greatest range. This provides more time for the CPCX to react and defeat the incoming missile threat. A radar such as the SPS-49 has much less power output and shorter range detection capability. Power output is an important characteristic in the detection of a high flying or beam centered (CL) target. The detection of a sea skimming (SS) target is much more difficult than the detection of a high flyer. The sea skimming target is masked by the earth's curvature and its detection range is based primarily on the CPCX's height of radar. A height of 20 meters was used for all radar calculations.

Two radars which stand out in this analysis are the SPY-1D and XPAR or X-band Phased Array Radar. The XPAR is similar in design to a SPY-1D but operates with an X band frequency. The reduced size and weight of the XPAR are more compatible with a small ship design such as the CPCX. In addition, the X-band phased array design operates at a higher frequency and offers improved resolution over the S-band SPY-1D in open ocean and littoral environments.

G. MEASURES OF EFFECTIVENESS (MOE)

Measures of effectiveness were developed for each vital mission area as determined from the ORD. Each MOE provided a relative gauge of the Combat System capability with respect to cost in a specific mission area. A description of each MOE is located below.

The strike MOE equates the parameters used for the number of strike missiles (N_M), range (R), ability to target (P_T), circle error probability (CEP), ship cost (CS) and the number of missiles needed for a kill (N_K). The strike MOE evaluated the CPCX's capability to launch long range strike missiles against land targets. The Coast Guard Variant was not evaluated with this MOE because it was not expected to carry out strike warfare missions.

$$\text{Strike MOE} = \frac{N_M * R * P_T}{CEP * CS * N_K}$$

The air engagement MOE equates the parameters used for defense efficiency (DE), probability of kill given a hit for the ship ($P_{K/H}$), ship cost (CS) and the number of air defense missiles (N_M). The air engagement MOE evaluated the CPCX's capability to defend itself against enemy missiles. Both variants were evaluated with this MOE based on the threat of missile attack.

$$\text{Air Engagement MOE} = \frac{1 - [DE * P_{k/h} * N_M]}{CS}$$

The sub-surface engagement MOE equates the parameters used for number of vertically launched ASROC or VLA (N_A), range of VLA (R_A), number of surface vessel torpedoes (N_S), range of surface vessel torpedoes (R_S), effectiveness of MK 50 torpedo (P_K), and ship cost (CS). The sub-surface engagement MOE evaluated the CPCX's capability to defend itself against an underwater submarine threat. The Coast Guard Variant was not evaluated with this MOE based on little need for ASW detection capability.

$$\text{Sub-surface Engagement MOE} = \frac{[(N_A * R_A) + (N_S * R_S)] * P_K}{CS}$$

The Naval Gun Fire Support (NGFS) MOE equates the parameters used for number of guns (N_G), range of gun fire in kilometers (R_G), weight of each round (W), number of rounds (N_R), circle error probability (CEP), and ship cost (CS). The NGFS MOE evaluated the CPCX's capability to provide gun fire support. There was no requirement for the Coast Guard Variant to have a large caliber gun so the Coast guard Variant was not evaluated with the NGFS MOE.

$$\text{NGFS MOE} = \frac{N_G * R_G * W * N_R}{CEP * CS}$$

The patrol area MOE equates the parameters used for search width in nautical miles (W), velocity in knots (V), search time in hours (T), area of search in square nautical miles (A), and ship cost (CS). The patrol area MOE evaluated the CPCX's capability to effectively search large areas of ocean.

$$\text{Patrol Area MOE} = \frac{1-\left\{\left[e^{-(W*V*T/A)}\right]_{ship}+\left[e^{-(W*V*T/A)}\right]_{helo}\right\}}{CS}$$

The convertibility MOE equates the relative difficulty involved in the conversion of each major job. A numerical factor will be assigned to each major conversion job based on its estimated completion time. The scale below shows the weighting factors (RD) with the respective cutoff times:

RD=0.25 - Critical path job with estimated completion time greater than 14 days.
RD=0.50 - Non-critical path job with estimated completion time greater than 14 days.
RD=0.75 - Non-critical path job with estimated completion time greater than 7 but less than 14 days.
RD=1.00 - Non-critical path job with estimated completion less than 7 days.

The product of these conversion factors is the convertibility MOE which was evaluated for both Variants. Each Variant is required to be convertible to the other in a four week period.

$$\text{Convertibility MOE} = RD_1 * RD_2 * RD_3 * \ldots RD_n$$

The ship signature MOE equates the parameters used for ship displacement (LT), estimated stack temperature in degrees Celsius (T), estimated machinery plant noise in decibels (N), and ship cost (CS). The ship signature MOE evaluated the CPCX's susceptibility to acoustic and infrared detection.

$$\text{Ship Signature MOE} = \frac{1}{D*T*N*CS}$$

The boarding MOE equates the parameters used for number of boarding parties (N_P), number of small boats (N_B), Availability of boats (A_B), and ship cost (CS). The boarding MOE evaluated the CPCX's capability to conduct boarding operations.

$$\text{Boarding MOE} = \frac{N_P * N_B * A_B}{CS}$$

Table 2 - Navy Variant Whole Ship Options

	Option 1	Option 2	Option 3
Radar	SPY-1D	XPAR	SPS-49
	SPS-67	SPS-67	SPS-67
	TAS	-	TAS
ASW Sonar	SQR-19	ATAS	SQR-19
	SQS-56	-	-
Mine Sonar	SH-100	SH-100	SUTEC DOUBLE EAGLE
Passive Element	SLQ-32	SLQ-32	SLQ-32
	VIDEO/OPTICAL	VIDEO/OPTICAL	VIDEO/OPTICAL
	IR Mk-46	IR MK-46	IR MK-46
Helicopter	PANTHER	PANTHER	PANTHER
Small Boats	4	2	2
MFCS	MK 99	MK 99	-
Illuminator	SPG-62	SPG-62	-
GFCS	Mk 34 GFCS	Mk 34 GFCS	MK 86 GFCS
GFCS Radar	SPG-60/SPQ-9	SPG-60/SPQ-9	SPG-60/SPQ-9
ASW System	SQQ-89	SQQ-89	SQQ-89
ASW FCS	Mk-309 ASWFC	Mk-309 ASWFC	
Command & Decision	VOICE COMMS	VOICE COMMS	VOICE COMMS
	GPS	GPS	GPS
	TACAN	TACAN	TACAN
	IFF	IFF	IFF
	WCS	WCS	WCS
	ACDS	ACDS	ACDS
	CEC	CEC	CEC
	JMICS	JMICS	JMICS
Air Defense System	ISDS	ISDS	ISDS
Large Gun	155 mm	127 mm	127 mm
Small Gun/Point Defense	(2) CIWS	(2) 40 mm	(2) 40 mm
Launcher	Mk 49 (RAM)	Mk 49 (RAM)	MK49 (RAM)
AA Missile	RAM	RAM	RAM
Launcher	-	-	CANNISTER
Anti Ship Missile	HARPOON	HARPOON	HARPOON
Launcher	VLS	VLS	ABL
Strike Missile	TOMAHAWK	TOMAHAWK	TOMAHAWK
AA Missile	ESS	ESS	-
	SM-2 MR	SM-2 MR	-
ASW rocket	VLA	VLA	-
Torpedo Launcher	SVTT	SVTT	SVTT
	MK 50	MK 50	MK 50
Decoy	SRBOC	SRBOC	SRBOC
	NIXIE	NIXIE	NIXIE
Mine Disposal	EOD TEAM	EOD TEAM	EOD TEAM

Table 3 - Coast Guard Variant Whole Ship Options

	Option 1	Option 2	Option 3
Radar	SPY-1D	XPAR	SPS-49
	SPS-67	SPS-67	SPS-67
	TAS	TAS	-
ASW Sonar	SQS-56	-	-
Mine Sonar	SH-100	SH-100	SUTEC DOUBLE EAGLE
Passive	SLQ-32	SLQ-32	SLQ-32
	VIDEO/OPTICAL	VIDEO/OPTICAL	VIDEO/OPTICAL
	IR Mk-46	IR Mk-46	IR Mk-46
Helicopter	DOLPHIN	DOLPHIN	DOLPHIN
Small Boats	4	4	3
GFCS	MK 92 GFCS	GFCS	GFCS
GFCS Radar	CAS/STIR	GFCS RADAR	GFCS RADAR
ASW System	SQQ-89	-	-
ASW FCS	Mk-309 ASWFC	-	-
Command & Decision	VOICE COMMS	VOICE COMMS	VOICE COMMS
	GPS	GPS	GPS
	TACAN	TACAN	TACAN
	DATA FUSION	DATA FUSION	DATA FUSION
	WCS	WCS	WCS
	ACDS	ACDS	ACDS
	CEC	CEC	CEC
	JMCIS	JMCIS	JMCIS
	IFF	IFF	IFF
Air Defense System	ISDS	ISDS	ISDS
Large Gun	76 MM	-	-
Small Gun/Point Defense	CIWS (1)	(2) 40 mm	(1) 40 mm
Launcher	Mk 49 (RAM)	Mk 49 (RAM)	-
AA Missiles	RAM	RAM	STINGER
Torpedo Launch	SVTT	-	-
Torpedo	MK 50	-	-
Decoy	SRBOC	SRBOC	SRBOC
	NIXIE	NIXIE	NIXIE
Buoy Handling	CRANE and STOWAGE	CRANE and STOWAGE	CRANE and STOWAGE
Mine Disposal	EOD TEAM	EOD TEAM	EOD TEAM

The overall MOE equates the individual MOEs discussed above with an individual weighting factor for the relative importance of that MOE against the other MOEs. The equation below shows the overall Measure of Effectiveness:

$$MOE_{overall} = \sum MOE_i * WF_i$$

H. WHOLE SHIP OPTIONS

The functional allocation requirements and individual system evaluations were used to define three whole Combat System suite options for the CPCX. These whole ship options are shown in Table (2) for the Navy Variant and Table (3) for the Coast Guard Variant. The Combat System elements chosen for each whole ship option were analyzed on the basis of satisfying operational requirements and performing warfare functions in the detect, control, engagement sequence. The functional allocation tables for each whole ship option are contained in Appendix (F). Each whole ship option has varying capabilities and cost, but all options satisfy the requirements in the ORD and defeat the projected threats.

I. ELEMENT VS. ELEMENT INTERFACES

The Combat System suite for each whole ship option was placed in a table to develop the architecture for each suite. Each specific element was linked to other elements in the system by means of either an electrical, data, mechanical, or logical interface. These interfaces show how the whole system will be connected and provide a basis on which to develop the Combat System architecture. The systems chosen drove the Combat Systems architecture or Ring Information Network (RIN). The network is depicted in Figure (1), which shows how the information from outside the loop is used to make decisions inside the loop and then flows back out to be implemented. The Element Interface Tables are included in Appendix (G).

J. ELEMENT VS. SHIP SUPPORT SYSTEM

A table of ship support systems for each Combat System element was developed. The first of three whole ship options was used to generate the table, which is included as

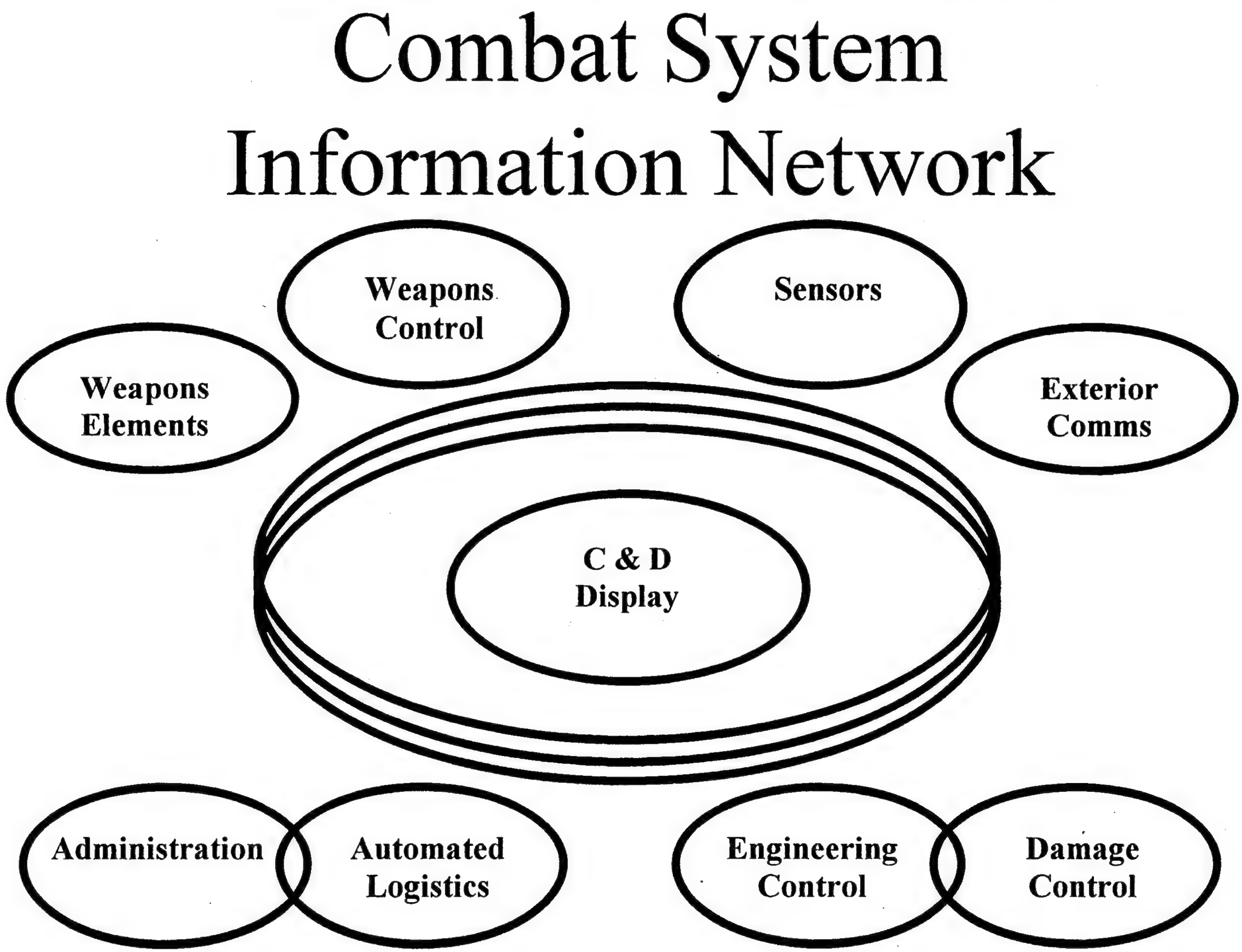


Figure 1. Combat System Architecture - Ring Network

Appendix (H). This ship option had the most equipment and the other options could be characterized as a subset of the first ship. For the most part, the support system interfaces were determined from experience and the TS4000 course notes. Almost all of the elements required electric power. The shipboard electric distribution system is not specified. It could be either AC or DC. The type of electric power is only specified for 400 Hz power. The 400 Hz power is used mainly in topside equipment to reduce the size and weight of motors.

During the preliminary design of a single ship option, the exact requirements for each system will be investigated to determine the capacity required for the individual support systems. The shipboard electric distribution will be finalized and sized to allow for growth and emergency backup capacity.

K. ELECTROMAGNETIC INTERFERENCE (EMI):

To provide a basic gauge of which systems are likely to induce or be subjected to EMI, a table of operating frequencies was developed. This table is included as Appendix (I). The EMI table shows the frequency band where each Combat System element operates. The L and X frequency bands contain most of the Combat Systems elements and are the areas most likely to experience EMI. The X band is shared by the surface search radar, fire control radars and SHF communication frequencies. The L band is shared by the TAS, IFF, TACAN and VHF/UHF communication frequencies.

L. ANALYSIS OF OPTIONS

After researching Combat System suites and choosing three whole ship options, each option was again dissected to come up with the "best" choice. The following tools were used for this process: Warship 21, self-defense engagement scenarios, and MOE analysis.

1. Warship 21 Analysis:

Warship 21 provided initial cost and size data. Each option's payload was entered into Warship 21 along with a standard propulsion and electrical plant that met the ORD

requirements of sustained speed and range. The program provided cost data which was used as input for the MOEs. The printouts from Warship 21 are included in Appendix (J).

2. Self-Defense Engagement Scenarios:

Engagement scenarios were completed on each option to determine whether the combat systems payload could meet the prospective threats as defined by the ORD. Defense efficiencies were calculated from the engagement scenarios. Self-defense data is included in Appendix (K). This data includes a sample engagement description, summary table of defense efficiencies, and the individual engagement diagrams.

3. MOE Analysis:

The MOEs described earlier were used to quantify the relationship between each whole ship option. Data collected from individual system characteristics, Warship-21, and self-defense engagements were used with the MOE equations to determine which ship option was most effective in each mission area. Weighting factors were then used to indicate relative importance of each mission area and the overall MOE for each option was calculated. A summary of the MOE tables are contained in Appendix (L). The highest overall MOE was used to select the recommended Combat System payload for each variant.

M. RECOMMENDATION, NAVY

All three whole ship options met or exceeded survivability requirements and are feasible. The balance of requirements and costs led to the conclusion that the "Option Two" vessel was the best solution to the diverse requirements established by joint inter-operability, convertibility, survivability and broad utility as reflected in the MOEs. Option One, which included high-end systems offered increased capability but at a higher cost, which approached the maximum ship cost leaving no margin for unforeseeable costs. Option Three, which included low-end systems appeared to meet all requirements and was rapidly convertible but lacked significant offensive payload. The chosen option offers a formidable weapon payload capable of effective self-defense against sea skimming

missiles, strong offensive firepower to strike targets tens of miles away, and rapid conversion to a Coast Guard Variant. The broad spectrum of possible options presented by modular combat systems allows the chosen option to be improved with future combat system upgrades as they become available. Option Two provides the most balanced design between cost and capability for a small naval combatant for the 21st Century.

N. RECOMMENDATION, COAST GUARD

All three whole ship options met or exceeded survivability requirements and are feasible. The balance of requirements and costs led to the conclusion that the "Option Two" vessel was the best solution to the diverse requirements established by joint inter-operability, convertibility, survivability and broad utility as reflected in the MOEs. Option One, which included high-end systems, offered increased capability but at a higher cost which exceeded the maximum ship cost. This option also included a sonar system which is not necessary for the Coast Guard mission but was included to enhance convertibility in the event the Navy chose Option One. Option Three, which included low-end systems, appeared to meet all requirements but was more difficult to convert to an effective Navy variant. The chosen option offers a formidable weapon payload capable of effective self-defense against sea skimming missiles, adequate offensive firepower to conduct Enforcement of Laws and Treaties, and rapid conversion to a Navy Variant. The broad spectrum of possible options presented by modular combat systems allows the chosen option to be improved with future combat system upgrades as they become available. Option Two provides the most balanced design between cost and capability for a Coast Guard Cutter for the 21st Century.

III. COMBAT SYSTEMS JUSTIFICATION

The following is a brief summary and justification of each combat system element included in the design.

A. DETECTION SYSTEMS

1. Air Search Radar: XPAR (1)

The X-band phased array radar (XPAR) incorporates most of the capabilities of a SPY-1D, in a scaled down version. XPAR's higher frequency allows the radar's dimensions and weight to be reduced significantly while it provides long range detection, tracking and over-the-land capability. It is capable of surface search, air search, fire control, and navigation. The non-rotating antenna design promotes stealthy architecture. The XPAR looks to the future as radars continue to get smaller and lighter.

The Navy variant was required to defend against three sea skimming missiles in a period of one minute. This requirement drove the need for a high performance radar that could detect this threat and provide an instantaneous fire control solution to fire weapons in defense. The Coast Guard variant was not faced with this same threat, but the XPAR was included as part of its Combat System suite to minimize conversion issues.

2. Surface Search Radar: SPS-67 (1) & Furuno (1)

The SPS-67 will be employed as the primary surface search radar, with the primary navigation radar, the Furuno, as the backup. Both radars are currently in use on numerous naval craft surface craft and thus do not require any additional research and development or operational testing. The combination of these two radars provides for excellent navigation functions and target resolution in a modern, lightweight package.

3. IR Search: MK 46 Electro-Optical detector (1)

The MK 46 will be used for infrared detection and tracking. IR in combination with the video/optical system provides visual pictures during low light and adverse weather conditions. Additionally, the MK 46 can detect heat plumes of sea skimming missiles over the horizon, enhancing self defense capability.

4. Helicopter: HH-65 Dolphin (1) USCG AS-565 Panther (1) USN

The Dolphin is currently in use by the Coast Guard and many foreign navies. It is lightweight, compact and offers a good balance between long range capability and mission flexibility. The militarized version of the HH-65, Panther, will be utilized with the Navy variant. It is capable of carrying sonobuoys and torpedoes for ASW as well as air-to-surface missiles for surface engagements and over-the-horizon targeting.

5. Identification: Identify Friend or Foe (IFF)

IFF will be used as an identification system to differentiate enemy from friend. In today's and the future's battle situation, IFF will play a key role in preventing fratricide.

6. ESM: SLQ-32(V)3 (2)

The SLQ-32 is the standard system for active/passive electronic support in the U.S. Navy. It provides highly directional electromagnetic detection and jamming capability to enhance survivability characteristics.

7. Sonar: Active Towed Array Sonar (ATAS) (1)

ATAS provides the capability of an active hull mounted sonar with the flexibility and modularity of a tail which can be easily removed to meet conversion requirements. The lack of a required Coast Guard sonar capability along with the inherent

limited effectiveness of a hull-mounted sonar, eliminated the hull-mounted sonar from consideration. Other factors such as the extra weight, volume, cost and maintenance associated with a hull mounted sonar contributed to its elimination.

8. Mine Sonar: SH-100 (1)

The hull mounted SH-100 provides mine localization and identification up to 1000 meters. Additionally, it provides bottom mapping and survey capability. The SH-100 is retractable and accessible from within the ship for ease of operation and maintenance. The SH-100 is installed in both the Navy and Coast Guard variants.

B. COMMUNICATIONS

1. External Communications: (Misc.)

The communications suite will consist of the following types of equipment: HF, UHF, VHF, and SATCOM. The ship will have the ability to access any and all strategic or tactical data networks, such as JMCIS or ACDS and CEC networks. Cooperative Engagement Capability (CEC) allows the CPCX to conduct engagements cooperatively with other ships. The goal is real time communication for worldwide connectivity.

2. Internal Communications (Misc.)

The interior communication system will consist of a fiber optic digital multiplexing system for voice and data distribution, with traditional sound powered phones and portable wire-free radios for damage control and emergency backup voice communications.

C. WEAPON CONTROL SYSTEM

1. Missile Fire Control System: MK 99 (1)

The MK 99 MFCS uses the XPAR to control SM-2 anti-aircraft missiles in flight. This system is currently used by all Aegis cruisers and destroyers and will require little research and development to integrate the Mk 99 with the XPAR.

2. Gun Fire Control System: MK 34 (1)

The MK 34 fire control system allows the use of the XPAR as a gun fire control radar. This eliminates the need for additional radars, reducing cost and topside weight.

3. Anti-Submarine Warfare Fire Control System: MK-309 (1)

The ASW fire control system to be used with the ATAS, Vertical Launched ASROC (VLA), and Surface Vessel Torpedo Tubes (SVTT).

D. NAVIGATION SYSTEM

1. Navigation radar: Furuno, GPS, TACAN (1 ea.)

The Furuno radar is a commercial grade, low cost navigation radar. It was chosen over the SPS-64 because it is cheaper and easier to operate. It does, however, introduce an interface problem that needs to be solved. In addition, the Global Positioning System (GPS) will be used for accurate automated navigation. Portable GPS units will be used for small boat navigation. TACAN will be used for helicopter support.

E. ENGAGEMENT/WEAPONS

1. Long Range Intercept Missile: SM-2 MR (12 cells), ESS (4 cells)

After debating the various missile parameters, SM-2 was chosen for long range intercept of air targets. It offers accurate, long range capability and future upgrades and blocks within the standard missiles series will offer even greater capability including Theater Ballistic Missile Defense (TBMD). It is U.S. made and a standard on U.S. Naval

combatants. Enhanced Sea Sparrow (ESS) was chosen for intermediate engagements, thereby increasing the number of missiles carried and improving engagement flexibility. Both missiles are fully compatible with the vertical launching system.

2. Short Range Intercept Missile: RAM (21)

The Rolling Airframe Missile (RAM) was chosen as the short range missile for intercept of airborne targets. It offers passive IR and RF guidance and a trainable launcher for short range, high speed intercepts.

3. Anti-Ship Missile: Harpoon (8 cells)

The upgraded version of the Harpoon, featuring IR capability and VLS compatibility, will be used. The Harpoon offers long range anti-ship capability. The innovative feature of the missile is that it will be launched from the Vertical Launching System, thereby eliminating the need for a separate launcher.

4. Land Strike Missile: Tomahawk (9 cells)

The Tomahawk missile provides the capability to destroy or neutralize enemy targets ashore. It was chosen for the strike mission because of its high performance level and integration capability with VLS launcher.

5. Point Defense System: Bofors L70 40mm gun (2)

The 40mm guns serve dual purposes. They will be used for ultra-short range (point defense) airborne target intercept and in a more traditional sense as a self defense weapon against small surface targets. The need for a separate "CIWS" system is eliminated saving weight, space, and cost.

6. Small Caliber Gun: Bofors L70 40mm (2)

As stated above, the 40mm gun serves a dual purpose. The 40mm gun enhances the AAW point defense capability, improves self defense capability, and provides a meaningful weapon against small boats for boarding operations.

7. Large Caliber Gun: 5" -54 MK 45

The 5" gun provides the Navy variant with the capability to provide firepower support for amphibious and other ground forces. It is the standard U.S. large caliber gun for naval combatants and has the capability of accepting barrel and propellant source upgrades for future munitions.

8. Torpedo: MK 50

The MK 50 torpedo will provide the Navy variant with ASW engagement capability. It will be launched from the SVTT MK 32 torpedo tubes or with the Vertical Launch ASROC (VLA) launched from the VLS.

9. Missile Launching System: Vertical Launch System (VLS)

The VLS will hold SM-2, ESS, Tomahawk, Harpoon, and VLA missiles. This launcher configuration eliminates the need for additional launching systems. Topside space is made available and radar cross section is be reduced.

F. COUNTERMEASURES

1. ECM: SRBOC, NIXIE, SLQ-32(V3) (Misc.)

All available countermeasure systems will be used. The anti-missile versions will be launched using the MK 36 Super Rapid Bloom Offboard Countermeasures (SRBOC) Launcher. The SRBOC munitions provide protection against

missiles with active and passive radar and infrared homing systems. New countermeasures under development will be incorporated into the system.

IV. PRELIMINARY DESIGN PHASE

A. COMBAT SYSTEMS ARCHITECTURE

1. *Design Statement*

The CPCX Combat System and supporting elements are designed to meet the requirements delineated in ORD. Specifically, the combat system must:

(a) Provide anti-air self-defense against limited intensity threats;

(b) Provide anti-surface defense against third-world surface naval forces;

(c) Provide anti-submarine defense in deep and shallow water while employed independently;

(d) Provide firepower support for amphibious and other ground forces;

(e) Destroy or neutralize enemy targets afloat and ashore through the use of coordinated, precision strike weapons;

(f) Conduct engagements cooperatively with other ships, submarines, aircraft, space systems, and land systems;

(g) Detect and chart underwater mines;

(h) Defend itself against raids of 3 ASCM's arriving within a one minute interval;

(i) Be capable of joining the Naval Fleet in joint operations and during time of war;

(j) Provide coastal intelligence gathering.

2. Top Level Design Goals

Based on the above requirements, the top level combat system design goals are:

(a) self-defense;

(b) discriminate targets minimize unwanted damage;

(c) fight hurt--minimize damage by effective assessment and rapid restoration;

(d) continuous high readiness for extended periods;

(e) self-sufficient, capable of independent or small group operations;

(f) reduced manning;

(g) built in automatic reconfigurability of ship's based on evolving threat scenario/condition;

(h) built in fault identification with rapid repair capability; and

(i) combat system automation with preset options for layered self-defense.

3. Combat System Description and Capability

Figure 2 depicts the functional arrangements of the CPCX combat system. General design attributes include:

(a) Primary connectivity between elements is provided by a multi-channel, multi-redundant fiber optic ring bus. Envisioned is a series of five functionally redundant data buses geographically separated within the ship to decrease vulnerability. Each system has multiple channel capacity and each channel has the capability to carry multiplexed data. Determination of data types and flow that allow use of multiplexing vice dedicated channels must be determined during detailed combat system design. The application of the Fiber Optic Data Multiplexing System (FODMS) and Fiber Optic Interior Voice Communications System (FOIVCS) improves capability and enhances survivability while reducing ship acquisition cost, primarily via the associated weight and volume savings.

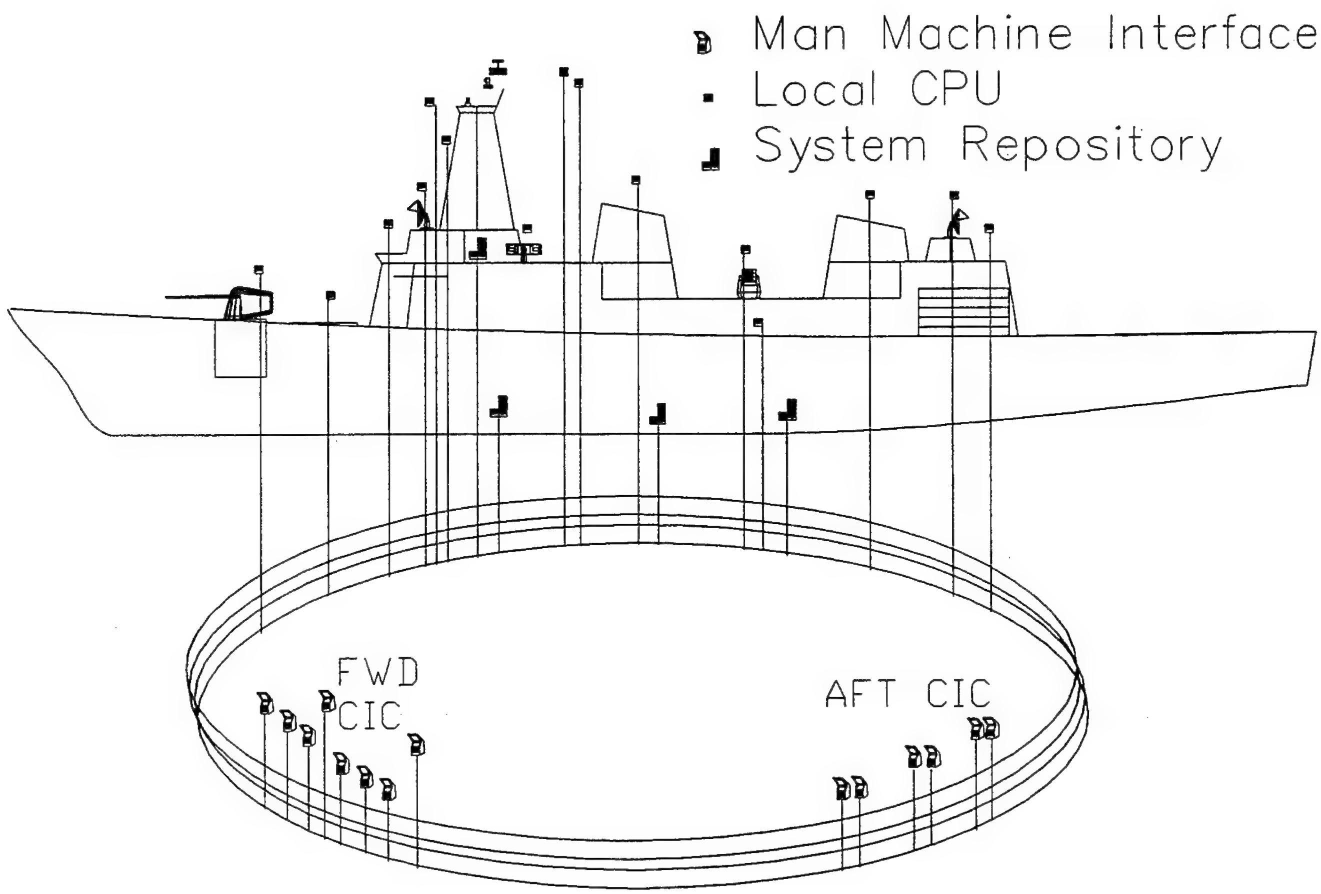


Figure 2 Ring Information Network Distribution

(b) The processing capabilities for all shipwide systems are distributed throughout the ship instead of being located in one central location. There will be no "central computer" in the traditional sense . The computer processing power required by all combat systems is distributed among the individual elements and linked by the fiber optic ring bus. This distributed processing capability provides redundant computational capacity and eliminates processing bottlenecks. The system will contain the following types of hardware:

(1) System Repository Units. These units perform the system control functions and provide the system software storage capability. There are four of these units distributed throughout the ship. This ensures that the system will have a control station in the event of a casualty to the system or battle damage.

(2) Multipurpose Man Machine Interface (MMI) Consoles. These represent generic, programmable operator interface consoles that provide the man/machine interface for the combat system elements or administrative data elements. These consoles are militarized versions of modern, commercial workstations. They allow the operator to access all information on the data bus and perform the watch station functions as required by the watch organization or administrative duty. Each MMI unit will contain processor hardware.

(3). Local element processing units. Each Combat System element will have a local processor unit designed to function primarily as the processor for that element. The system control station will have the capability to access the local processor to perform other system functions as necessary.

(c) The system is design to integrate not only the combat system elements, but also other functions vital to the ship's mission. Engineering and Damage Control stations will be included to automatically provide up to date equipment status to the decision makers. Automated logistics functions will be performed to reduce equipment

downtime and all administrative functions will be maintained electronically to eliminate paper.

(d) Two manned Combat Information Center (CIC) spaces are provided. CIC #1 is the primary control space and is supported by CIC #2. Although the spaces are designed to function as a single control unit, equipment functional redundancy is provided between the two spaces to allow a single space to function individually if necessary. The processing equipment, display panels and number of control operator stations are almost identical. The two CIC's are located in separate enclaves to improve survivability. The elements in the spaces utilize all available sensors and external information data stream to provide the necessary information to create a complete tactical picture.. The tactical picture created must be complete and coherent enough to provide necessary reaction time for ship defense. The major functions performed by the combat system elements are:

(1) Detection. These elements determine contact detection and develop basic track data on contacts. The elements exports the track data to the ring bus for distribution and use by other combat system elements. This function is performed by sensor equipment including, but not limited to AN/SPS-67 radar, X Band Phased Array radar, ATAS, AN/SLQ-32, Helicopter sensor suite, and all other passive or active elements.

(2) Control. These elements perform all control functions to go from contact detection to contact engagement. Track data from various detection elements on and off the ship is correlated and integrated into central track files. Track correlation contact parameters are initially fed into the ring bus. The next control functions are threat assessment as friendly, neutral, or enemy. The system then coordinates engagement decisions and sets the engagement priorities. Additionally, it coordinates own ship operations with the operations of other ships or aircraft in the task force. The system is capable of fully automated ship self-defense operation. The level of automation employed is determined by the Commanding Officer based on the tactical situation. Weapons selection and engagement coordination is also performed by these elements. The system maintains an inventory of available ordnance and carries out the engagement planning

needed for weapons release. The system coordinates the use of individual weapon elements to prevent interference between own ship weapons and damage to friendly forces. Following engagement battle damage assessment is also performed.

(3) Engagement. These elements deliver ordnance on target at the direction of the control elements. The necessary data for engagement is relayed by the ring bus. These elements are the guns, missile launchers, active countermeasures, torpedoes and all other similar systems.

(e) The power interface module provides the interface management function between the ship's engineering plant electric plant control module and the combat systems with regards to load shed command and coordination. The primary backup system is an uninterruptable power supply (UPS) which provides short term power backup. If there is continued loss of electrical generation capacity due to casualty, the electric plant control module sends a load shed command to the combat system, essentially conveying available generating and bus configuration. The interface module communicates with the control element to determine combat system needs commensurate with tactical situation. With a balance between power requirements (demand) versus generating capacity, the power system interface module transmits shut down commands to appropriate combat system elements and also communicates electric plant reconfiguration requests to the electric plant control module.

(f) Readiness assessment, fault detection and localization. The survivability management and readiness assessment (SM/RA) module works in conjunction with the various combat system element's built-in test and evaluation (BITE) capabilities to provide an integrated system readiness assessment. All the combat system elements must have this BITE capability. An additional BITE feature is the requirement that all combat system elements provide automated troubleshooting capability. This enhances fault localization and subsequent repair to place equipment fully operational in as short a time as practical. The readiness assessment sub-module provides the commanding officer (CO) and tactical action officer (TAO) with a real-time comprehensive assessment of the ship's ability to continue fighting. Additionally, it enables the

combat information center officer of the watch (CICO) and engineering officer of the watch (EOOW) to better coordinate efforts to maintain/recover mission readiness prioritized to current mission needs. The readiness data includes current status of mission capabilities, times to failure and times to recovery. Readiness data is obtained from all systems including auxiliaries that supply the individual combat systems.

(g) Survivability and reconfigurability. System survivability is enhanced by a number of design features, including:

(1) dual Control element functionality geographically separated in CIC #1 and CIC #2;

(2) multiple, distributed processing capabilities;

(3) multiple redundant connectivity between all combat system elements;

(4) graceful degradation of overall system capability due to power loss through the uninterruptable power supply and smart load shed management. With the available redundant/alternate functional capabilities, system reconfiguration is practical to optimize combat system employment during casualty conditions.

(h) Embedded training. The integrated combat system includes an embedded training module to allow realistic threat scenario engagement exercises. These training scenarios will exercise the control elements and watchstanders. Essentially, this entails the capability to run pre-programmed engagement scenarios by injection of track and other necessary data directly onto the data bus.

(i) Embedded support service management. Primary support services for the combat system are electrical, chilled water, sea water, ambient space cooling and high pressure air. With the zonal scheme, each zone has fully self-contained capability with the exception of

electrical power generation. Status of these systems is maintained by Damage Control Central (DCC) and the engineering plant status module. Support service configuration is coordinated with required combat system capability as determined by the tactical situation during casualty situations. Maximum capability will be maintained consistent with available capacity remaining during casualties. With input to/from the survivability management system, certain automatic damage control actions can be accomplished before a weapons hit occurs.

(j) Automated Communications Suite. To enhance manning reduction and increase external communications, the external communications suite is automated. This automation allows incorporation of the external communications function as an integral part of the integrated combat systems suite. Features such as automated electronic message routing with dispersed remote terminals streamline message dissemination. Automated external connectivity allows integration of the ship in a task force/battle group scenario. Export of sensor data and import of weapon command functions to extend the integrated fighting power of the task force/battle group. Import of real time data from outer sources provides a coherent, integrated picture of the battle space. With continuously updated information, the ship could support or be supported by other ships, engaging targets its own sensors cannot detect.

B. HULL, MECHANICAL AND ELECTRICAL (HM&E) ARCHITECTURE

The CPCX HM&E architecture was developed using Advanced Surface Ship Evaluation Tool (ASSET). ASSET can be used to construct a model of a entirely new ship, or a modification of an existing ship. ASSET uses historical data and empirical formulas to model the ship's geometry, its powerplant, weight, performance, cost, manning, etc. It is used as a preliminary design tool to determine whether or not a proposed design is feasible. ASSET is a powerful tool, but has it's limitations. The biggest limitation appears to be that it can not model what has never been tried before, either for a new hull design or a non-traditional use of a existing system.

1. Ship's Power Generation and Distribution System

A variety of engineering configurations were evaluated using ASSET. The combination of endurance and displacement requirements demanded a low volume, low weight, high efficiency power plant. The CODAG/Integrated Electric Propulsion offered the lightest vessel that met our requirements for speed, endurance and payload. The Additional benefits of the electric drive ship are numerous, including:

- More flexible power generation arrangements
- More freedom in plant arrangements
- Propulsion arrangement is not limited by shaft alignment
- Propulsion prime movers and generators can be smaller and more numerous
- Power can be generated in the most convent and/or efficient wave form
- More adaptable to future growth:
  - Directed energy weapons
  - ETC Gun Technology
  - Design conversion to fuel cells
- Better fuel economy

- Capability of operation at the most economic engine combination at any given speed
- Active Ship silencing capability
- Allows the power to the main engines to be adjusted to counteract cyclic load imbalances in order to reduce propulsion generated vibration

HULL, MECHANICAL AND ELECTRICAL (HM&E) ARCHITECTURE

1. Ship's Power Generation and Distribution System CPCX uses an integrated Combined Diesel and Gas Turbine (CODAG) Power Off Main Bus (POMB) propulsion/ships service power plant. The power plant architecture consists of the following functional areas: power generation, power distribution, power conversion and conditioning, power storage, system loads, system control and information.

(a) Power Generation

There are four power generation sets,: two LM-1600 ICR gas turbines, each driving a 15 MW generator, and two Alco 12V270 diesels, each driving a 3000 KW generator. The power output is multiphase AC that is immediately rectified to DC for distribution on the DC Zonal Electric Distribution System (DC ZED).

(b) DC Zonal Electric Distribution System.

The power distribution system consists of port and starboard main busses feeding distribution zones as shown in Figure 3. The main lines aft of No. 1 ER are sized to provide full propulsion power on via either main bus. Portions of the main bus that are not expected to carry propulsion loads are sized to carry a full combat load.

(c) CS power supplies

The use of the DC ZED system allows multiple source paths without complex paralleling and switching systems. The power supply to the CS takes advantage of this ability by providing disbursed supplies from each of the main generators and

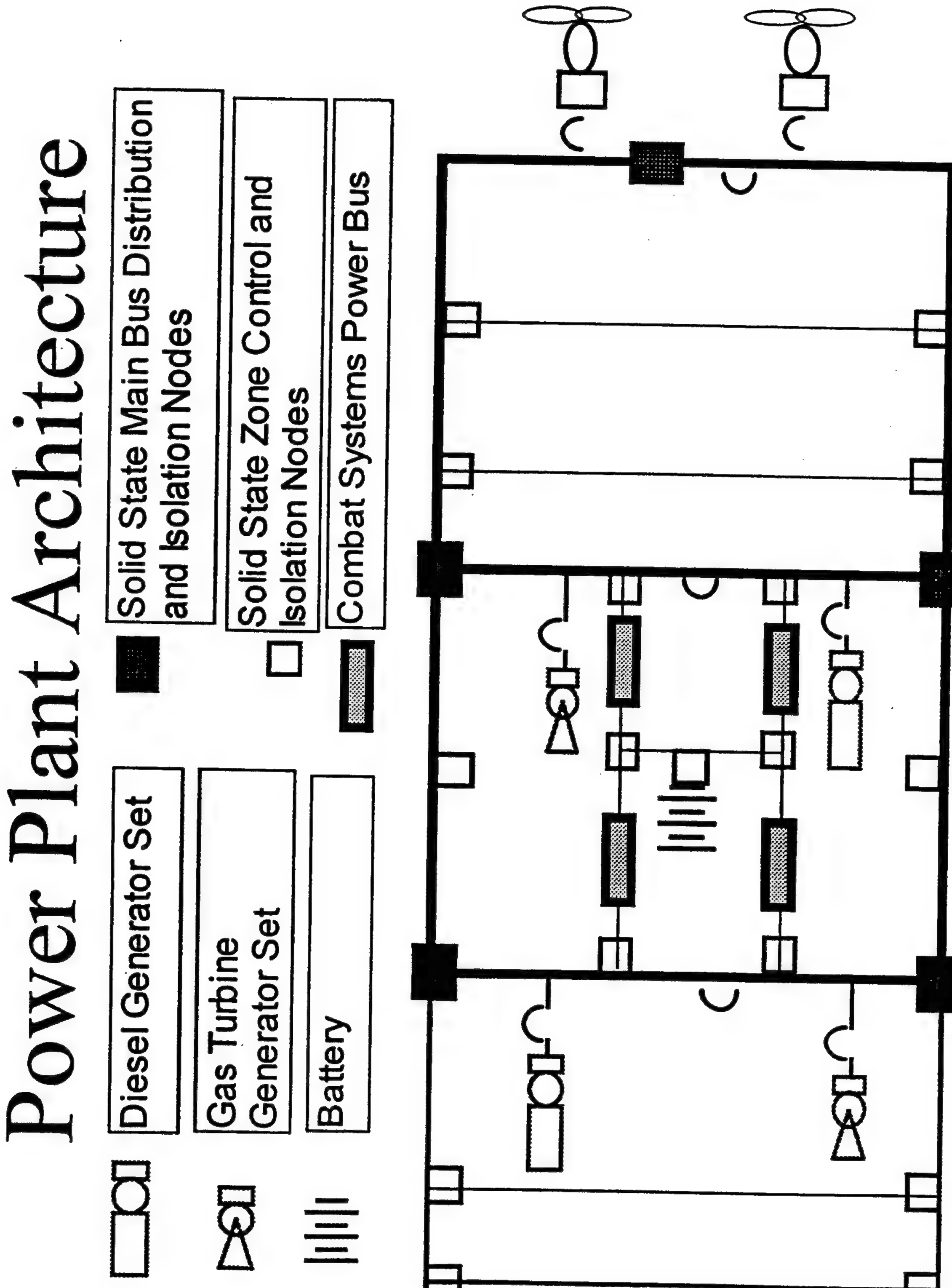


Figure 3 Electrical Distribution System

directly from the battery as shown in Figure 3. The four Combat System power buses (CSPB) are electrically the closest to the generators and the battery, Isolation and switching nodes can protect the CSPB's from abnormalities on the rest of the distribution system. The solid state controllers and isolation and switching nodes can present the combat system with an "infinite" bus as long as there is sufficient power available.

(d) Battery backup

To maximize survivability and system flexibility, a 30 ton battery was installed to provide emergency power in the event that all main generators go off line. The primary advantage of this, is that the battery is static and thus not as susceptible to shock as the generators. It will provide bus inertia and stability during shock events and continuing power when the generators trip off line on impact. A secondary but no less desirable benefit of the battery is the ability to cruise using the most efficient power plant alignment. Figure 4 shows the power generation requirements vs. speed for CPCX. It is important to note that most speeds can be attained using one gas turbine or two diesels engines operating at a moderate to heavy loaded. The battery allows operating turbines at their most efficient loading without compromising combat readiness of the ship during cruising and patrol/loitering operations. The ability to provide uninterrupted power during casualty loss of generators is also beneficial during Restricted Maneuvering conditions wherein the ship would still be able to maintain bare steerage propulsion and rudder control. The battery would also help reduce the run time on the ships engines, since only those engines required to provide power need be running. Standby engines can be started when necessary and can be allowed to pre-lube and soft start rather than emergency start at the lose of the on-line units (tactical situation permitting)

(e) Control and Monitoring

The power distribution system is overlaid with fiber optic control and monitoring network. This network connects the solid state controllers of the ships equipment to the control stations and monitoring computers. The solid state controllers effectively isolate the individual loads from the main bus and allow more accurate

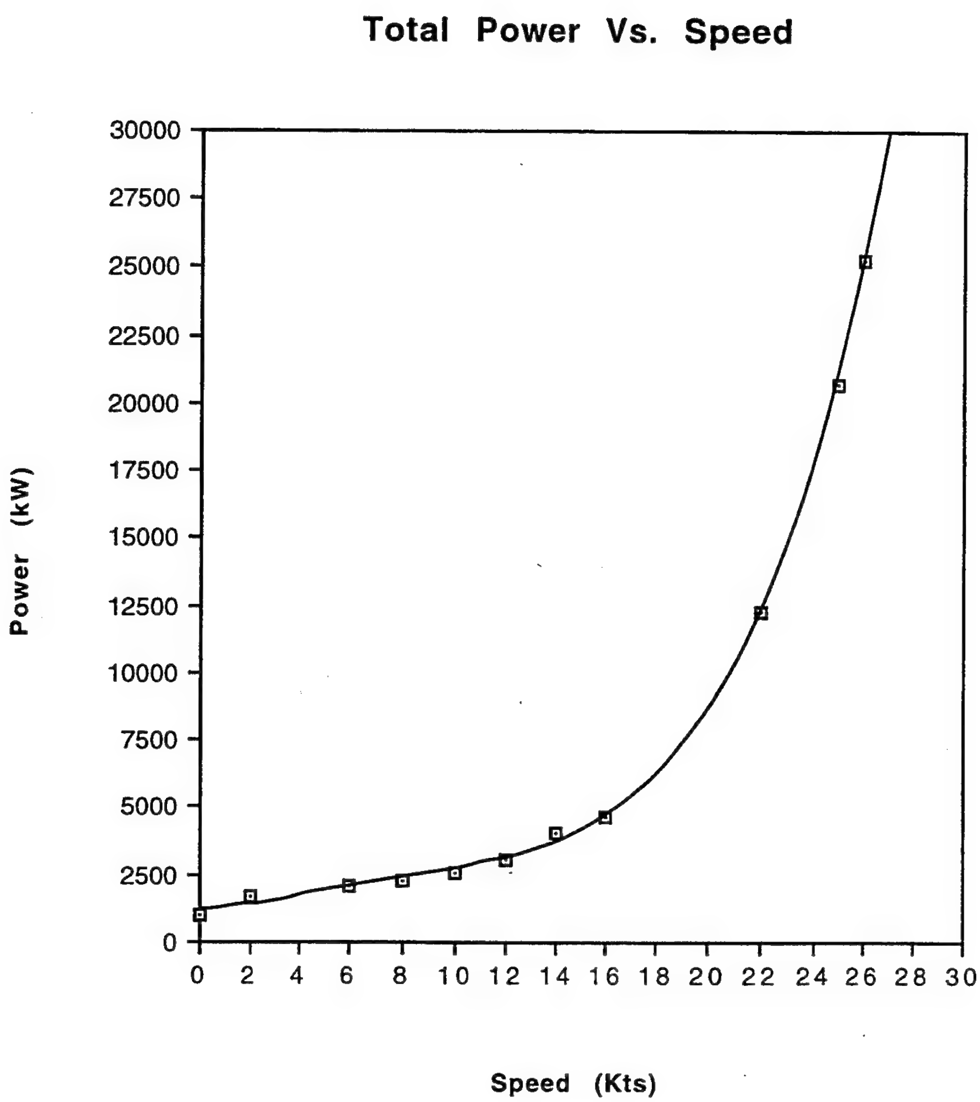


Figure 4 Power Curves

monitoring of cyclic load fluctuations of the individual loads. Central monitoring and control of the ships equipment allows more accurate failure analysis, faster fault detection and isolation, and smarter, more effective load shedding and load restoration. Automatic central control and monitoring greatly enhances the ability to implement condition based maintenance and significantly improves trend analysis and reduces the need for paper equipment logs.

2. *Hull, Mechanical and Electrical Arrangements*

(a) Machinery Spaces

The CPCX incorporates two main machinery spaces, Engine Room 1 (ER1) and Engine Room 2 (ER2). Each engine contains two power generation sets (gensets), one gas turbine and one diesel. The gas turbine gensets consist of General Electric LM1600 RGT, producing 15,902 Bhp, which is connected to a 14.94 MW AC generator. The diesel gensets consist of a Alco 12V270 producing 4000 Bhp, driving a 3,000 kW AC Generator. The AC power produced by the generators is rectified to DC for propulsion power and ship's service distribution throughout the ship. Both engine rooms are completely independent of each other with respect to support equipment.

Below is a listing of the major machinery components found in the engine rooms.

EQUIPMENT	NUMBER INSTALLED (per Engine Room)
Gas turbine genset module	1
Diesel genset	1
Lube oil service and purification system	1
Fuel oil service and purification system	1
High pressure air compressor	1
Low pressure air compressor (ship's service)	1
Power Conversion Modules	As required

Power Distribution Modules	As required
Machinery Control Equipment (local)	As required
Jacket water system (Diesel cooling)	1
Salt water cooling system (Diesel and generators)	1
Fire Suppression and Extinguishing System	1
Bilge Eductor	1
Machinery Room Ventilation System	1
Anti-roll fin system (in ER2 only)	1
Auxiliary Boilers (electric powered)	1

(b) Auxiliary Machinery Spaces

The CPCX incorporates 3 Auxiliary Machinery Spaces (AMS1,2 & 3), all on the fourth deck. AMS1 is located just aft of the VLS compartment, and includes access to the mine detection sonar trunk. Major equipments found in AMS1 include a vacuum type sewage collection, holding and transfer system that serves the forward end of the ship. A fire pump, air conditioning plant, fuel oil distribution manifold.

AMS2 is located between ER1 and ER2 and contains the reverse osmosis/potable water system, fire pump and air conditioning plant for the middle of the ship.

AMS3 is located aft of ER2. Its major equipment is the oily water separation system, and the third fire pump.

(c) Miscellaneous Engineering Spaces

The Miscellaneous Engineering Spaces include the Pod Machinery Room, After-Steering, stern launch area and the assorted shops (Machine, Electrical, Filter, and Damage Control).

The Pod Support Room will contain the Power Conditioning Modules (PCMs) for the motors in the pods. After steering will contain the steering gear and associated

equipment, while the stern launch area will contain ATAS or boats and NIXIE equipment, as well as handling equipment.

It is in the stern launch area where the most noticeable HM&E difference between the Navy and Coast Guard version exists. For the Coast Guard variant, this is the location of the Aft Boat Launch and Retrieval System. It consists of a pivoting, semi-buoyant, V-shaped ramp, which is lowered (drawbridge style) into the wake to allow for Rigid Hull Inflatable launch and recovery. The ramp is a steel framework, with rubber rollers along the sides of the V, much like a recreational boat trailer. The Navy variant will also have a similar system for launching and handling ATAS.

(d) Fuel Capacities

All diesel fuel tankage is distributed on the 3rd and 4th (inner bottom) decks of the CPCX Navy version. The Coast Guard version retains all of the Navy tanks and adds 7 more at the bottom of the VLS well and below it. The total diesel fuel tankage for the Navy Version is 143,976 gal. (466.6 ltons) and 183,160 gal. (593.6 ltons) for the Coast Guard version. The additional weight of the Coast Guard tankage, is offset by the removal of the VLS and the 5" gun and its ammunition. Both versions also carry 23,578 gal. (71.3 ltons) of JP-5 aviation fuel. The JP-5 tank is also located in the inner bottom, forward of ER2. The tank characteristic tables and graphs are shown in Appendix (M).

(e) Firemain System

The Firemain system for the CPCX is a hybrid of the traditional Navy (wet) and Coast Guard (dry) systems. It consists of 3 pumps (one in each Auxiliary Machinery Space), on a ring, that is segregatable into 3 independent loops. The firemain system will be used only for fire-fighting capability, vice as a fire and flushing/cooling system. Auxiliary cooling water for major systems will be provided via Auxiliary Saltwater (ASW) cooling pumps. This feature is intended to reduce maintenance on cooling systems, by providing cooling water at much lower pressures (30-60 psi vice 115-150 psi).

The key feature of the firemain system, are the hydro-pneumatic accumulator (HPA) tanks (3 each). The accumulator tanks will pressurize the entire main, each capable of provide 1 minute of firefighting water to two 95 gpm nozzles. This is sufficient time for the firepump(s) to start up and supply the system. The normal operating mode for the firepumps will be in a standby (off) status. The pumps will be activated via pressure switches on the accumulator tanks. A simple line diagram of the system is shown in Figure 4.

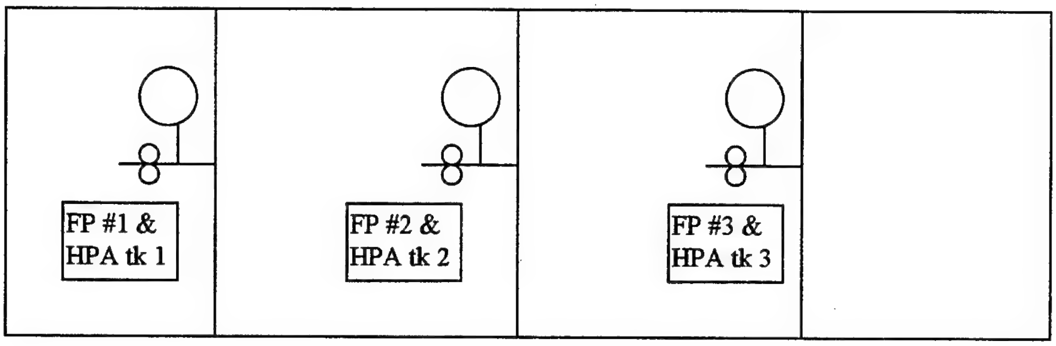


Figure 5 Firemain Line Diagram

The HPA tanks are charged off the ship's service low pressure air system. This system is designed to reduce the overall maintenance requirements for the pumps. While it can be expected that maintenance will increase on the starting circuits, the reduced maintenance on the pumps, and piping systems will more than offset the slight increase in electrical maintenance.

(f) Miscellaneous Engineering Features

Several key features of the CPCX in addition to those discussed above, include: Collective Protection System (CPS), federated compartments, vacuum sewage system, reverse osmosis distillation plant, combat system holdup battery, and automated machinery control system.

C. ARRANGEMENTS

1. Navy Variant

The detailed arrangement drawings for the Navy variant are included in Insert Pages (1) through (6). The drawings start on the 02 level and work down through the ship.

- Insert (1) : 02 Level -- Equipment placed here includes the 40mm multipurpose guns, Signal Shack, SRBOC locker, SPG-62 Equipment room, and mounts for various antennas.
- Insert (2) : 01 Level -- Major spaces include the Bridge, CO's Cabin, Chart Room, RAM Launcher and various equipment rooms. The location of the CO's cabin provides immediate access to the Bridge.
- Insert (3) : 1st Deck (Main) -- Key features include the 5" Gun, VLS Missile Modules (on Foc'sle), Officer Staterooms, Operations Office, Wardroom, Ship's Office, Helicopter Hangar, Aviation Repair Shop, Boat Rooms, Torpedo Rooms and Flight Deck. The Flight Deck is sized to launch/recover all current US/NATO inventory rotary wing aircraft with the exception of the CH-53. The Helicopter Hangar is composed of two major components, a fixed portion and telescoping portion, which will enable the stowage of the selected airframe, the AS-565 Panther.
- Insert (4) : 2nd Deck -- The 2nd Deck is characterized by two main outboard passageways, port and starboard, which run nearly the length of the ship. In addition to simplifying access, these passageways provide a protective buffer zone for small arms fire and shrapnel from close aboard misses. Major spaces forward include the Bos'n Locker, Forward Windlass Room, 5" Gun Control Room (immediately below gun), VLS compartment, Weapons Control Room for VLS, Repair Locker #2, Supply and Log Offices, and the Casualty Control Station (CCS), which is located between the two engine rooms. Immediately forward of amidships lies the Mess Deck, CPO Mess, Galley, Scullery, and Recycling (Trash) spaces. The AFFF station for the foward Engineroom is outboard of the Recycling Space. Aft of amidships is the secondary Combat Information Center, CIC #2. Repair Locker 5 (Machinery Repair) is situated between the two engine

rooms. The aft portion of the second deck contains CPO and crew berthing, Sick Bay, Fitness Room, Collective Protection System (CPS) airlocks and various storerooms. Furthest aft lies After Steering, which contains ATAS, NIXIE, and the steering gear.

- Insert (5) : 3rd Deck -- The forward portion of the 3rd Deck contains mostly unmanned spaces (Chain Locker, Upper 5" Magazine, VLS, and a storeroom). Amidships lies the majority of the respective technician shops and storerooms (machine, filters, electrical, tool room), the combat system holdup batteries (UPS) and laundry. The after end of the 3rd deck contains fuel tanks, storerooms, and the Pod Machinery Room.
- Insert (6) : 4th Deck -- The 4th Deck is the information and propulsion center of the CPCX. It houses the main warfighting, communication, and mobility stations onboard. The forward 3 compartments of the 4th deck contains the same spaces as the 3rd Deck (Chain Locker, Lower 5" Magazine, and VLS). Aft of the VLS is the SH-100 Mine Sonar Trunk, and Auxiliary Machinery Space #1. The primary Combat Information Center, CIC #1 is located just forward of Engine Room #1. This location provides two watertight bulkheads and one deck seperation between primary and secondary CICs. The space between the enginerooms is occuppied by Auxiliary Machinery Space #2, Refrigerated and Dry Stores, and Radio. Aft of Engineroom #2 is Auxiliary Machinery Space #3. Below the 4th deck are the majority of the CPCX fuel tanks, JP-5 and potable water tanks.

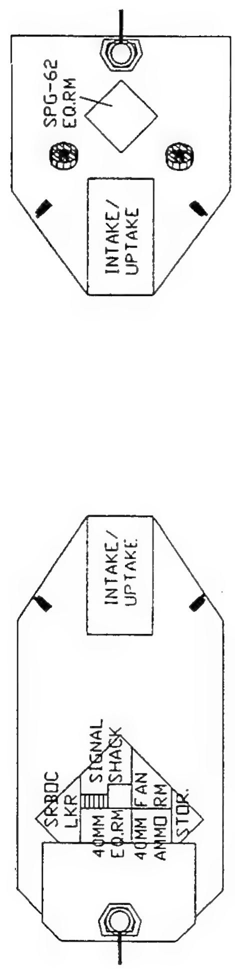
2. Coast Guard Variant

The detailed arrangement drawings for the Coast Guard variant are included in Insert Pages (7) through (12). The drawings start on the 02 level and work down through the ship. The only differences between Navy and Coast Guard layouts will be discussed below.

- Insert (7) : 02 Level -- Similar.
- Insert (8) : 01 Level -- Similar
- Insert (9) : 1st (Main) Deck -- On the foc'sle, the 5" Gun and VLS have been replaced by a hydraulic crane and storage well, respectively. The Torpedo Rooms have been converted into Prisoner Containment Rooms as well.

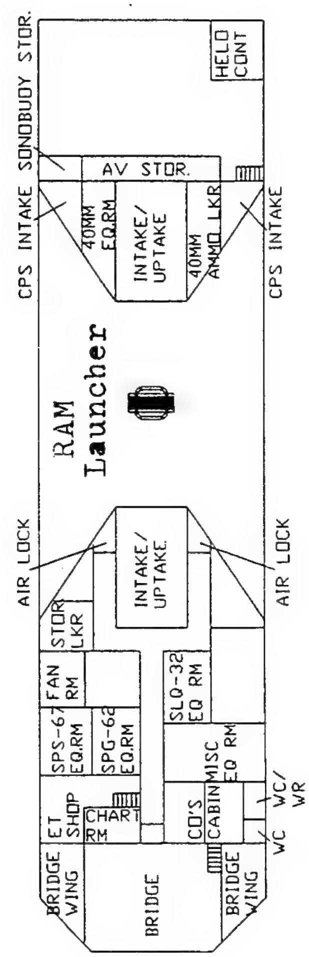
- Insert (10) : 2nd Deck -- The gun hydraulics in the space known as the Gun Control Room on the Navy version will remain to power the crane. The remainder of the space will be used for storage of an environmental containment skirt. The space once occuppied by the VLS is now dedicated to large item storage, such as bouys. The ATAS/NIXIE Room aft has been converted into a Rigid Hull Inflatable (RHI) Launch and Recovery Room, with an integral ramp through the transom.
- Insert (11) : 3rd Deck -- The Upper 5" Magazine has been converted into a storage room for an environmental containment skirt. Removable fuel tanks have been installed in the VLS space.
- Insert (12) : 4th Deck -- The Lower 5" Magazine has been converted into a storage room for an environmental containment skirt. Removable fuel tanks have been installed in the VLS space.

02 LEVEL



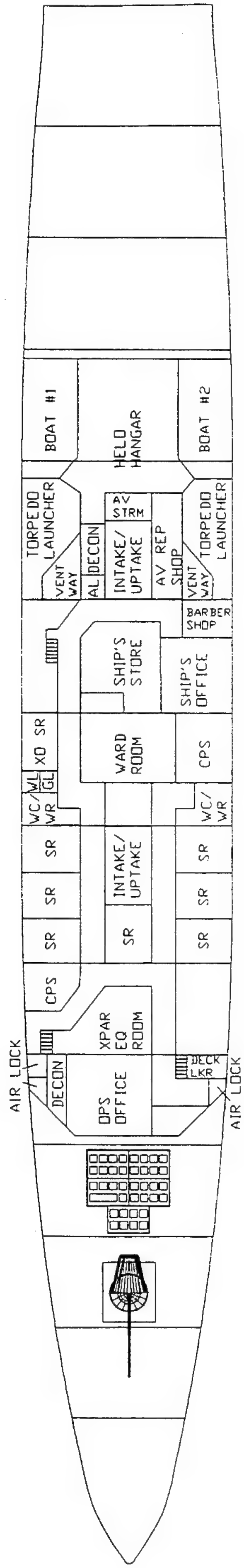
Insert 1
Navy Layout

01 LEVEL

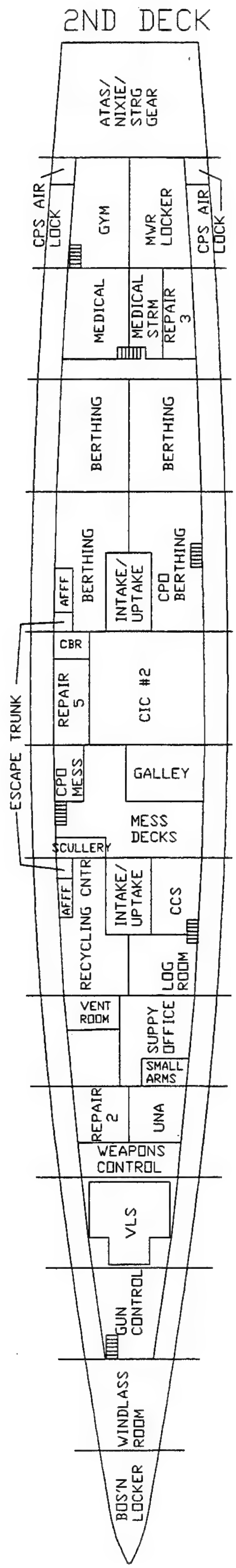


Insert 2
Navy Layout

1ST DECK

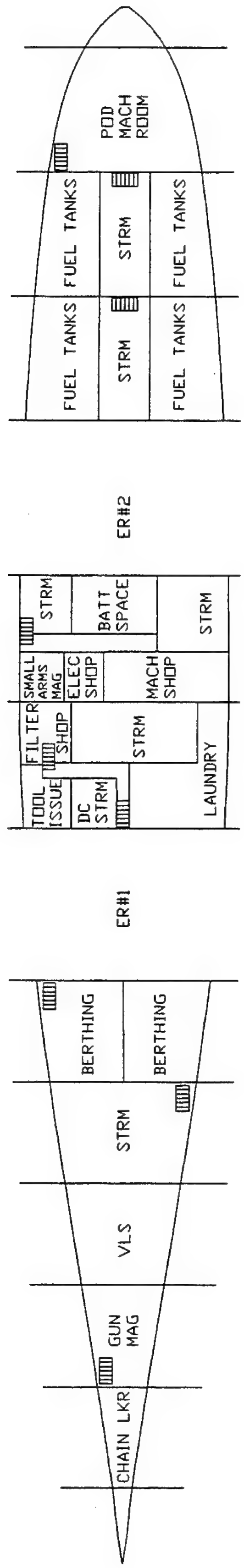


Insert 3
Navy Layout



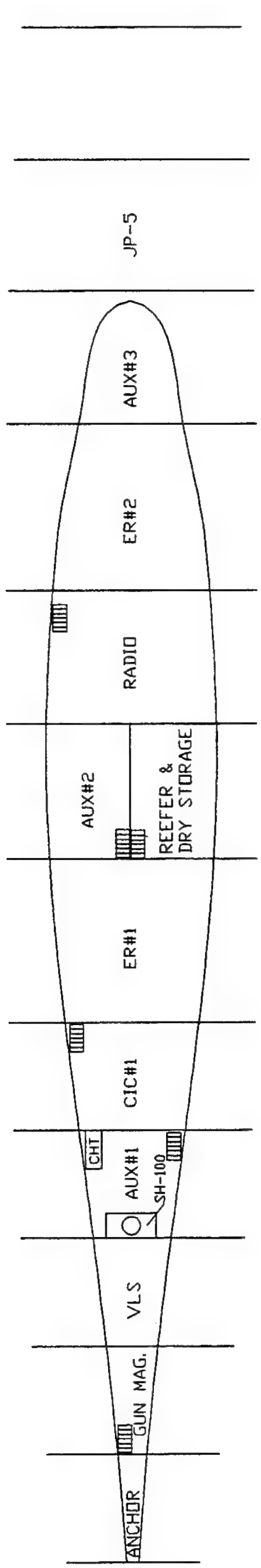
Insert 4
Navy Layout

3RD DECK



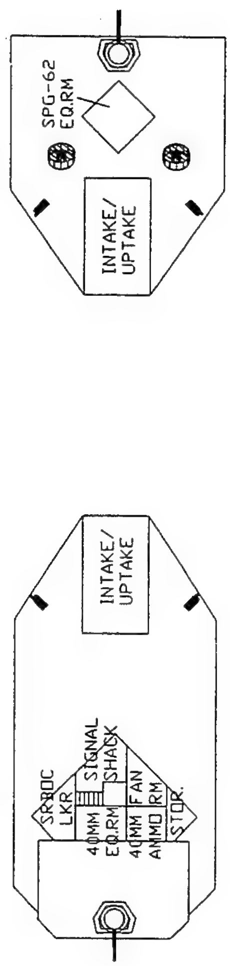
Insert 5
Navy Layout

4TH DECK



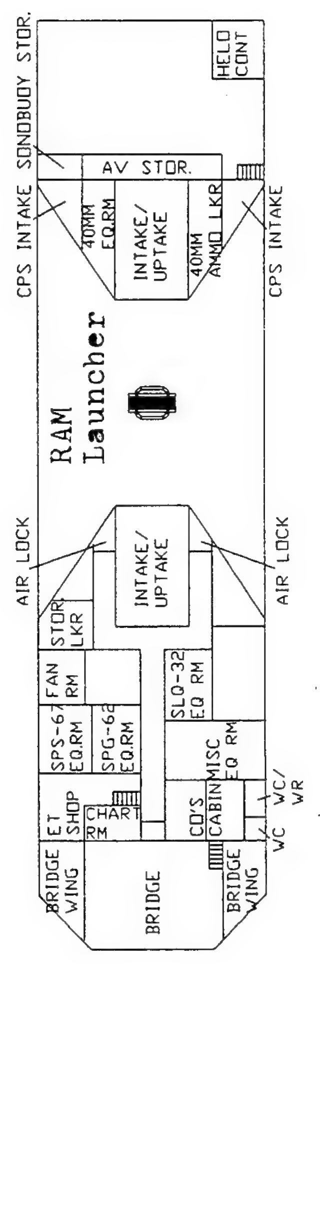
Insert 6
Navy Layout

02 LEVEL

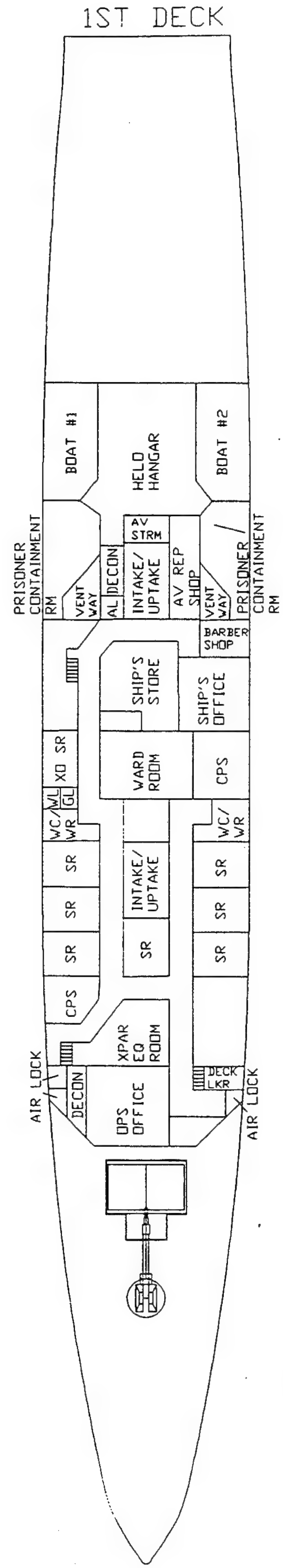


Insert 7
Coast Guard Layout

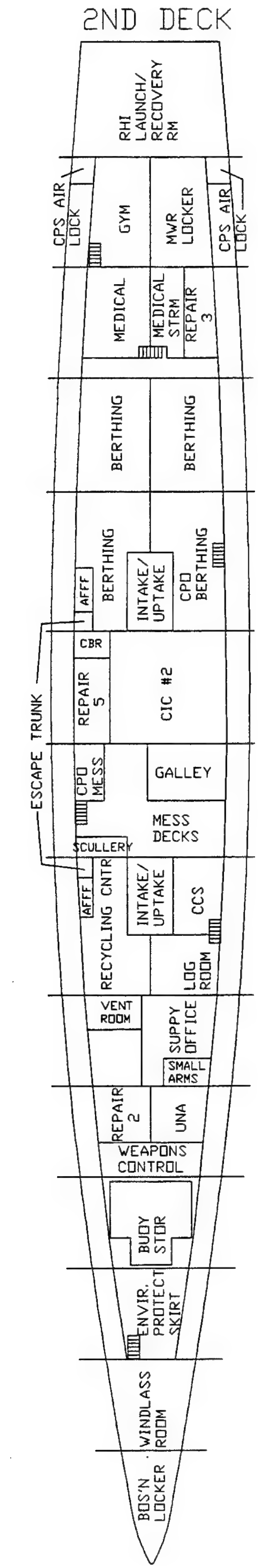
01 LEVEL



Insert 8
Coast Guard Layout

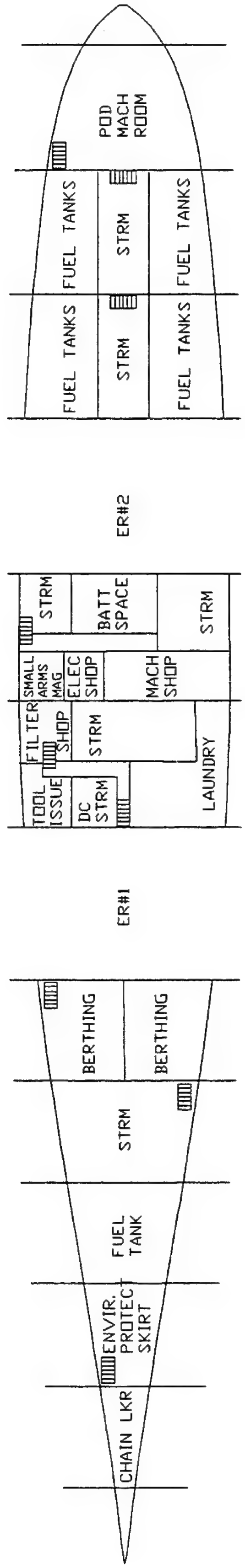


Insert 9
Coast Guard Layout



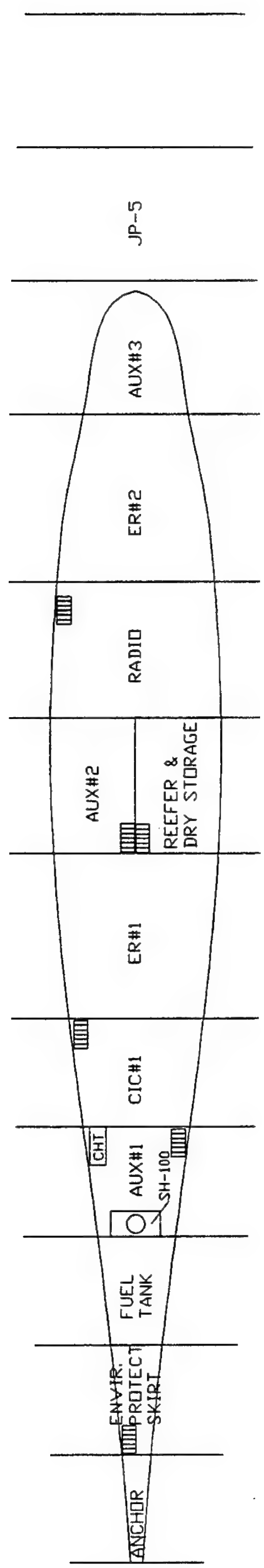
Insert 10
Coast Guard Layout

3RD DECK



Insert 11
Coast Guard Layout

4TH DECK



Insert 12
Coast Guard Layout

D. NAVAL ARCHITECTURE

The initial naval architecture calculations were done using ASSET, and the results are provided in Appendix (N) (ASSET printed reports) and Appendix (O) (ASSET Drawings). The offsets from the hull form were imported into "General Hydrostatics" (GHS), and analyzed. The naval architecture figures and calculations provided include: lines drawing, curves of form, cross curves of stability, floodable length, static stability, weight distribution, and bending moments. The computer models run through GHS were based on a full load displacement of approximately 4000 tons. This is a slight difference from the ASSET predictions of 3980 tons displacement. This displacement difference can be attributed to several factors: Appendages (pods, propellers, rudders, fins, bilge keels, skeg) were not modeled on GHS, but their respective weights were (due to complexity and time-constraints). Actual tankage vs. required tankages were also different. For example, ASSET did not include any lube oil storage capacity while the GHS model accounts for 9.62 ltons. The actual modeling of the tankage has several inherent inaccuracies as well. The tank size, location and permeability inputs for GHS were all estimated. Further iterations of the design would refine the geometry, most likely resulting in smaller tanks.

The most significant discrepancy with the hull geometry is the full load trim. It is at 3.5 ft forward. This is most likely due to the weight distribution (combat payload and fuel tankage) in the forward half of CPCX. Possible remedies include a redesign of the bow section to make it fuller, ballast aft, rearrangement of fuel tanks, and rearrangement of combat payload (VLS and main gun). The following charts and graphs were plotted from and computed by GHS and included in Appendix (P).

1. Body Plan and Isometric View

The Body plan and Isometric view are shown in Figure 6.

2. *General Hydrostatics*

The General Hydrostatic curves are shown in Figure 7.

3. *Curves of Form*

The curves of form are shown in Figure 8.

4. *Cross Curves of Stability*

The Cross Curves of Stability are shown in Figure 9. It provides a display of the ship's righting arm for various angles of heel, over a range of displacements. The curves displayed need to be corrected for the assumed KG, which in the figure shown is 0.0 ft.

5. *Floodable Length*

The floodable length curve is used to determine the allowable compartment lengths which will ensure that the margin line is not submerged, should the compartments spanning the defined factor of subdivision become flooded. As described in Design Data Sheet (DDS) 079-1, *Stability and Buoyancy of Naval Surface Ships*, the factor of subdivision for combatants is 15% of LBP, with a margin line of three inches below the bulkhead deck (main deck). The factor of subdivision for the CPCX is 57 feet. The standard values of permeability given in Principles of Naval Architecture, Vol. I (p. 190) are:

Cargo and Stores	0.6
Accommodations and voids	0.95
Machinery Spaces	0.85

GHS was used to calculate Floodable Length based on hull form, and the results were used to verify the bulkhead placement generated by ASSET. A worst case and best case scenario were used for the permeability value for the CPCX hull form. Worst case assumed a permeability of 0.95 for the entire ship, best case assumed a permeability of 0.70. The results are shown in Figure 10. CPCX meets the worst case foldable length criteria, except at the stern. There is one three bulkhead group that is 57 feet apart and another that is 57.5 feet apart. This necessitates further analysis into the actual placement and expected permeability's, which is recommended for future iterations of the design.

6. Static Stability Curve at Design Load Condition

The CPCX static stability curve is shown in Figure 11. The CPCX reaches a maximum righting arm of 5.140 ft at 46.1° of heel.

7. Hull Load Distribution Curve

The hull load distribution curve is shown as part of the bending moment curves described below.

8. Bending Moment Curve (sagging)

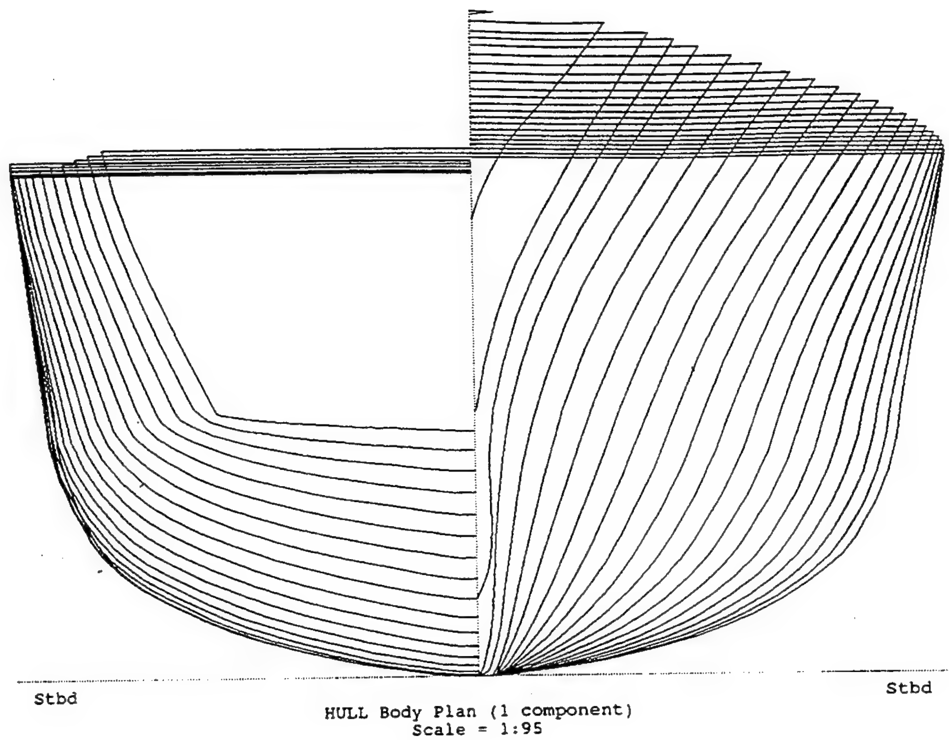
The Bending Moment curve (sagging) is shown in Figure 12. CPCX has a maximum bending (sagging) moment of 62,961 LT-ft at 191 ft aft of the forward perpendicular.

9. Bending Moment Curve (hogging)

The Bending Moment curve (hogging) is shown in Figure 13. CPCX has a maximum bending (hogging) moment of 57,893 LT-ft at 195 ft aft of the forward perpendicular.

10. Midship Section Structural Design

The Midship Section Structural Design developed by ASSET is shown in Figure 14.



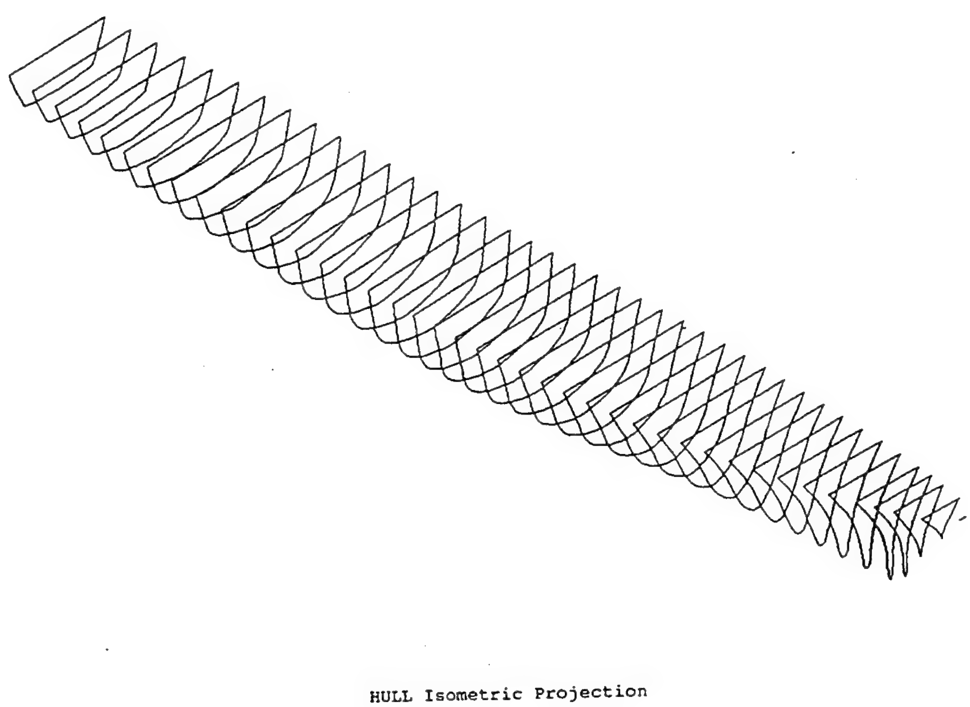


Figure 6 Body plan and Isometric View

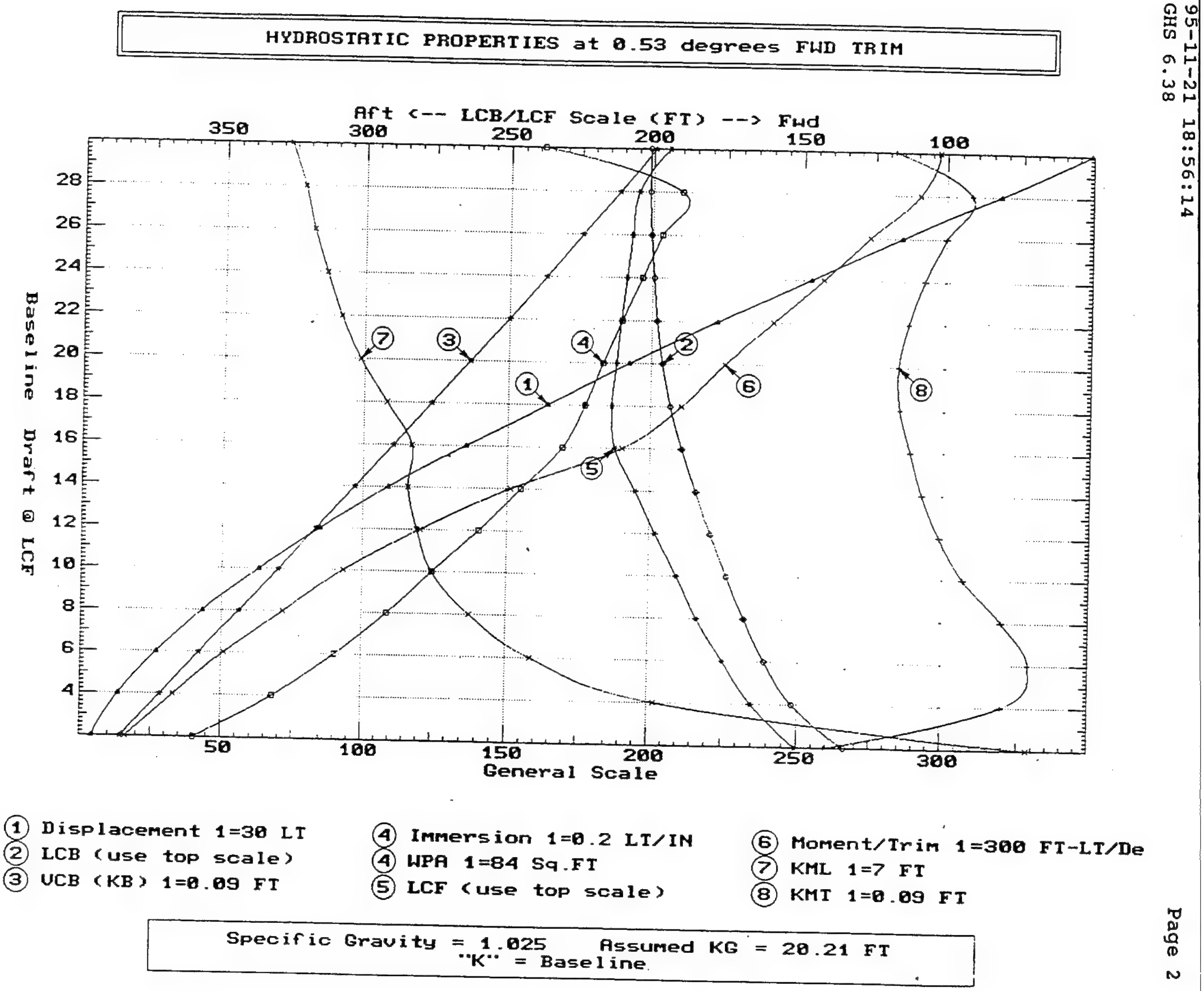


Figure 7 Hydrostatic Curves

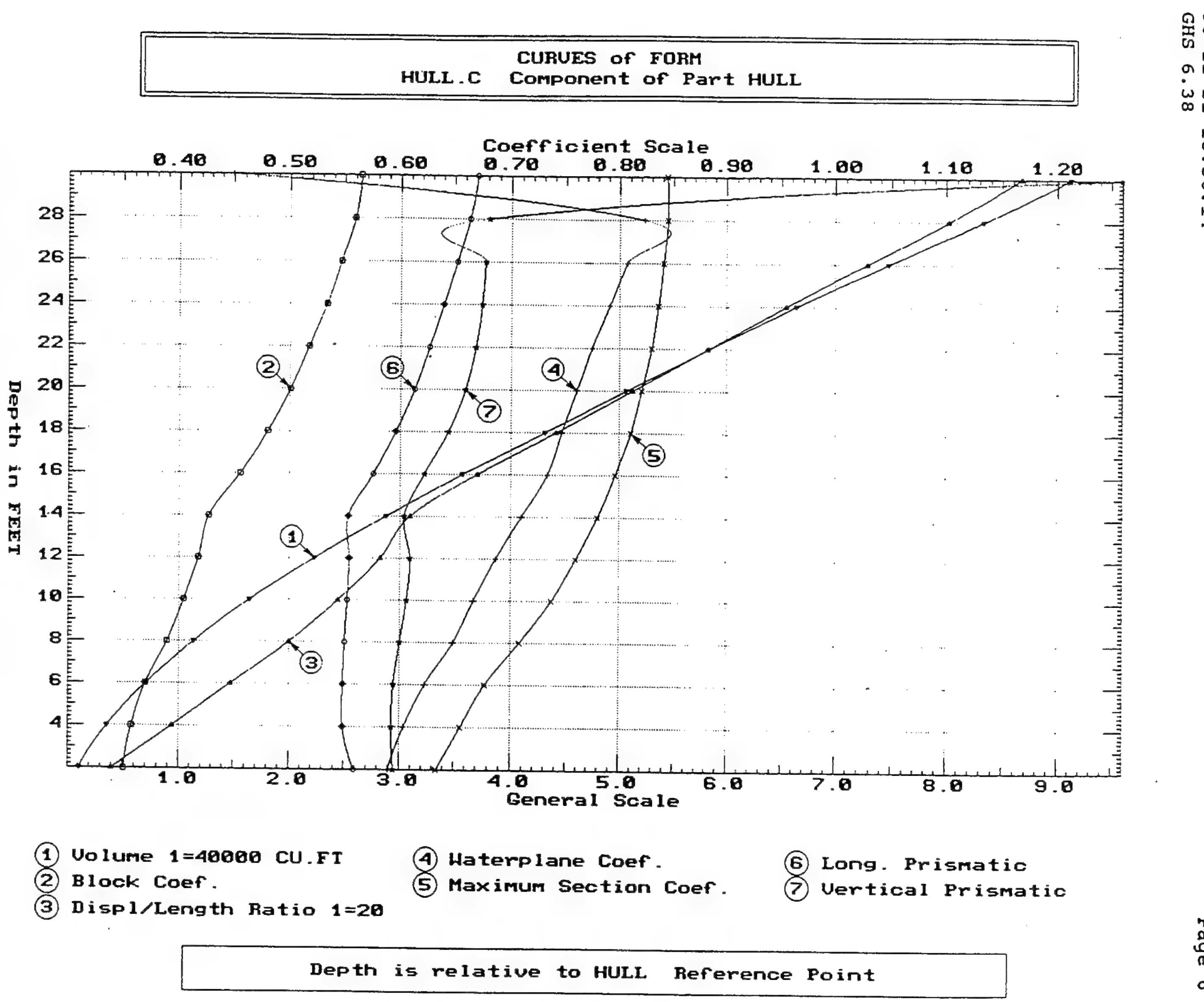


Figure 8 Curves of Form

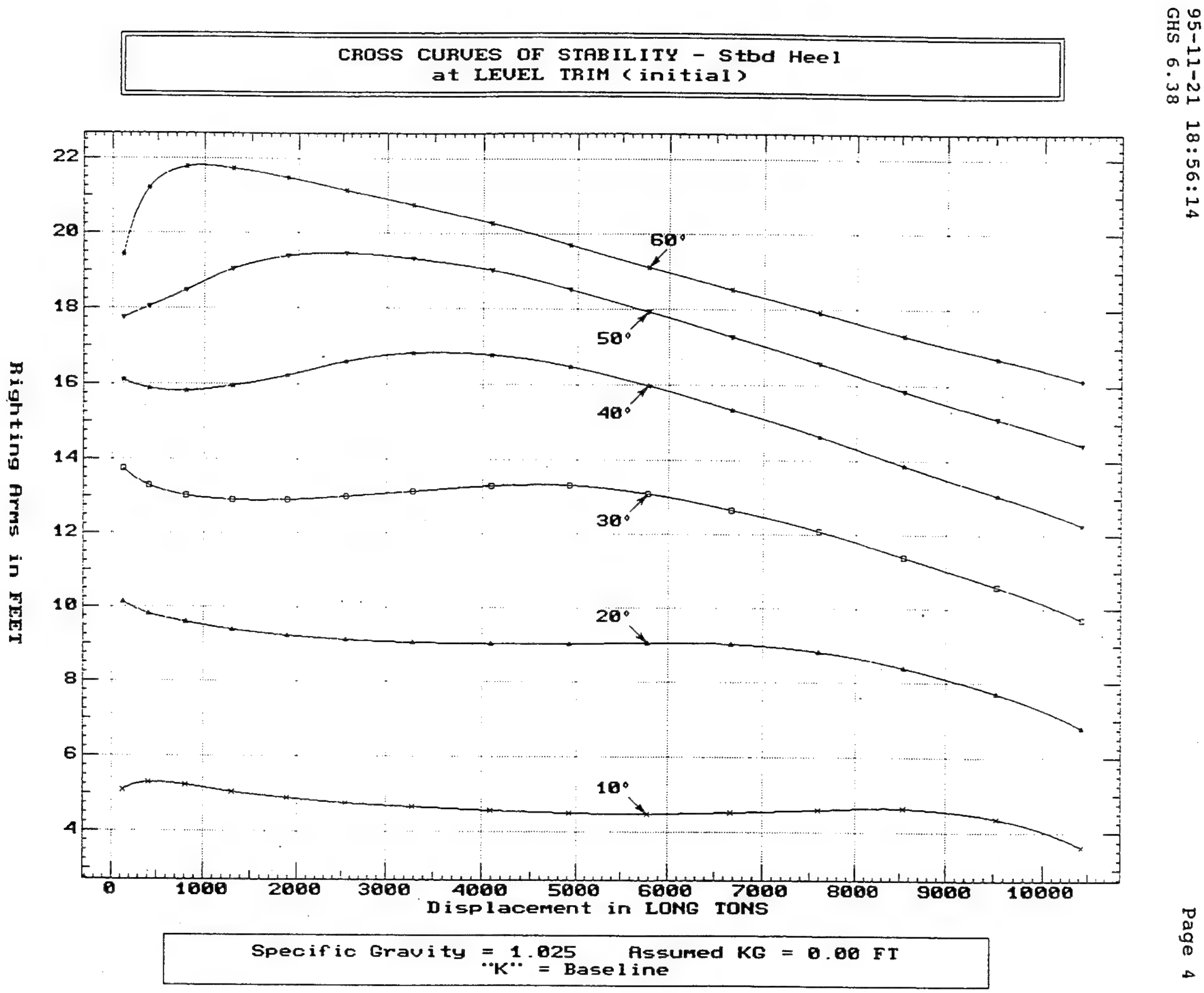


Figure 9 Cross Curves of Stability

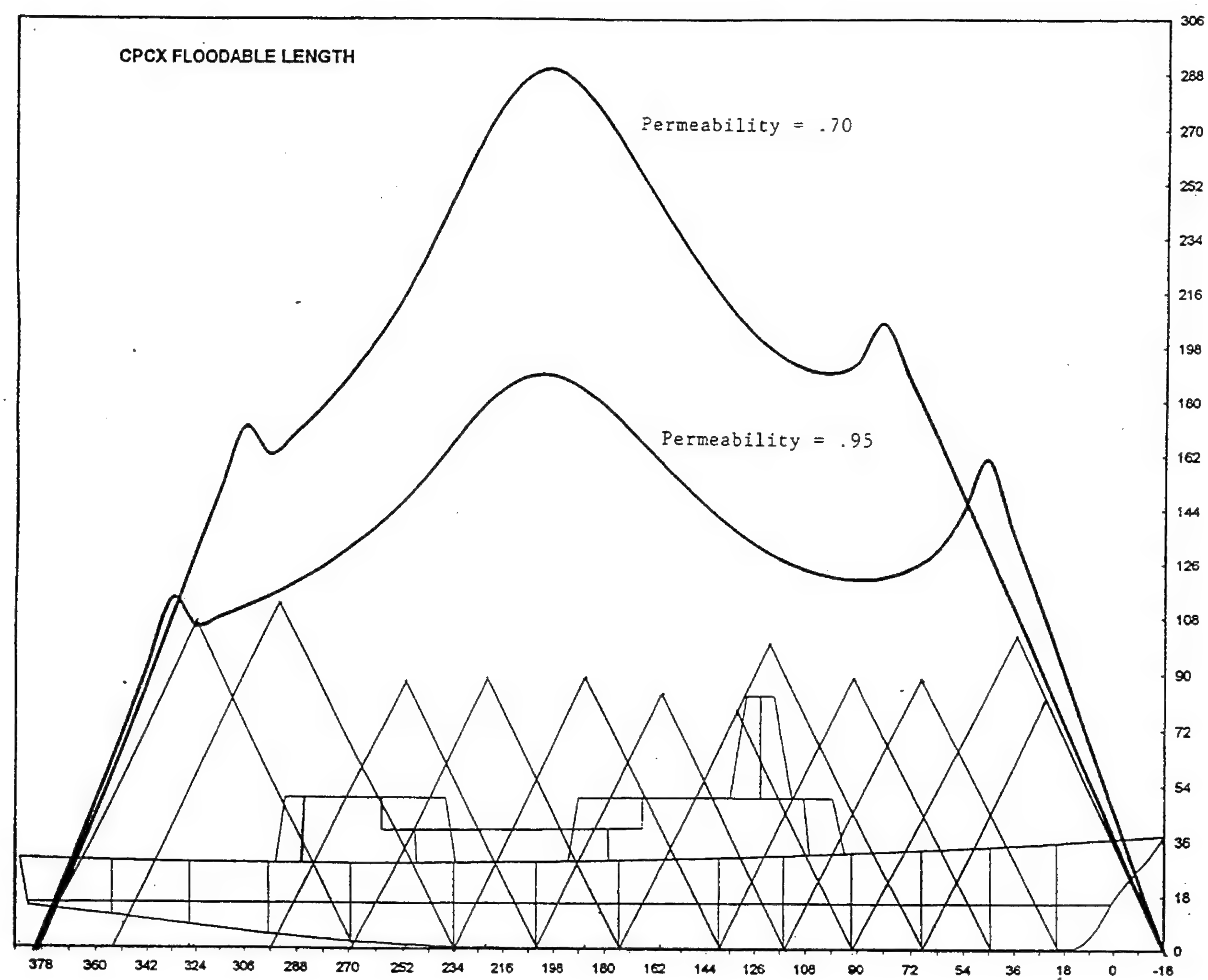


Figure 10 Floodable Length

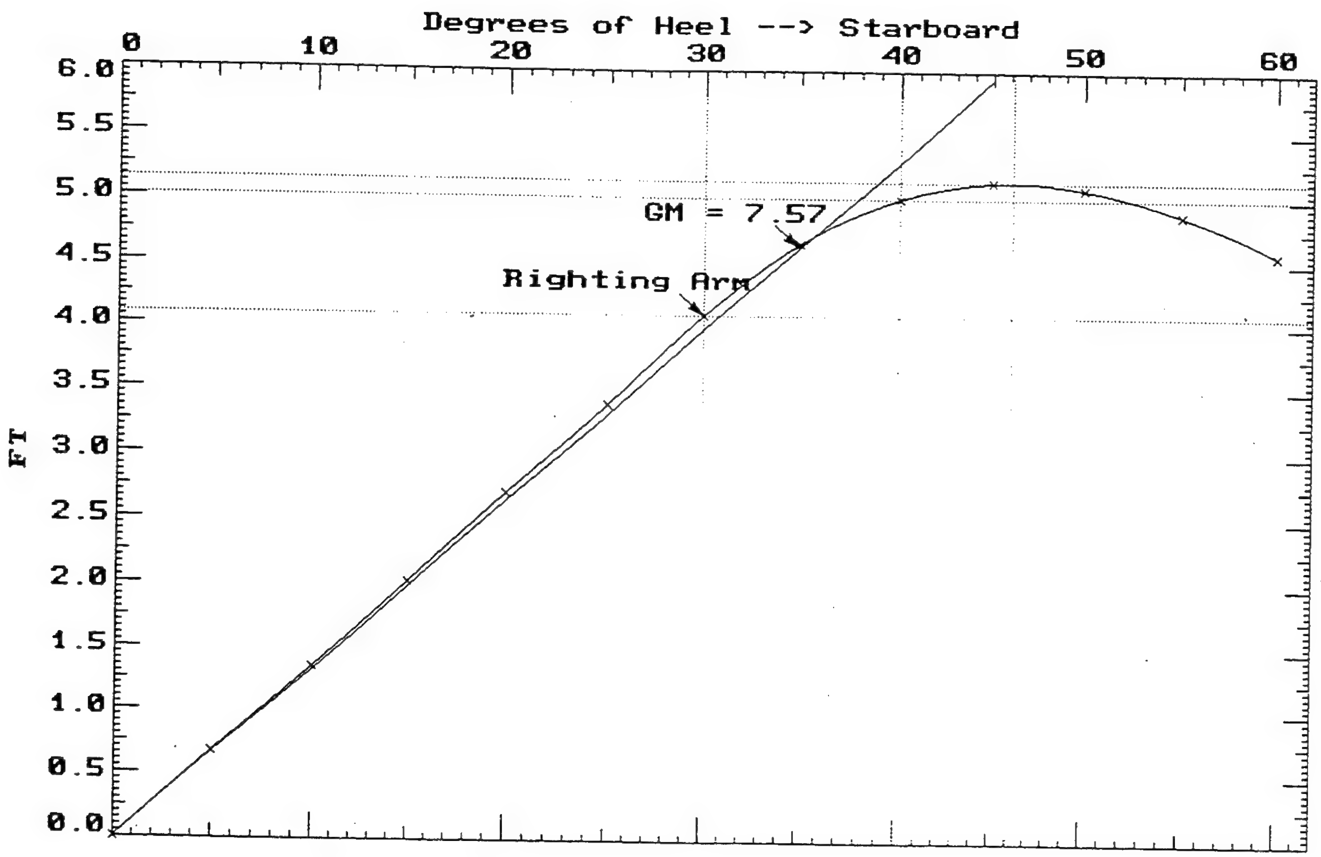


Figure 11 Static Stability Curve

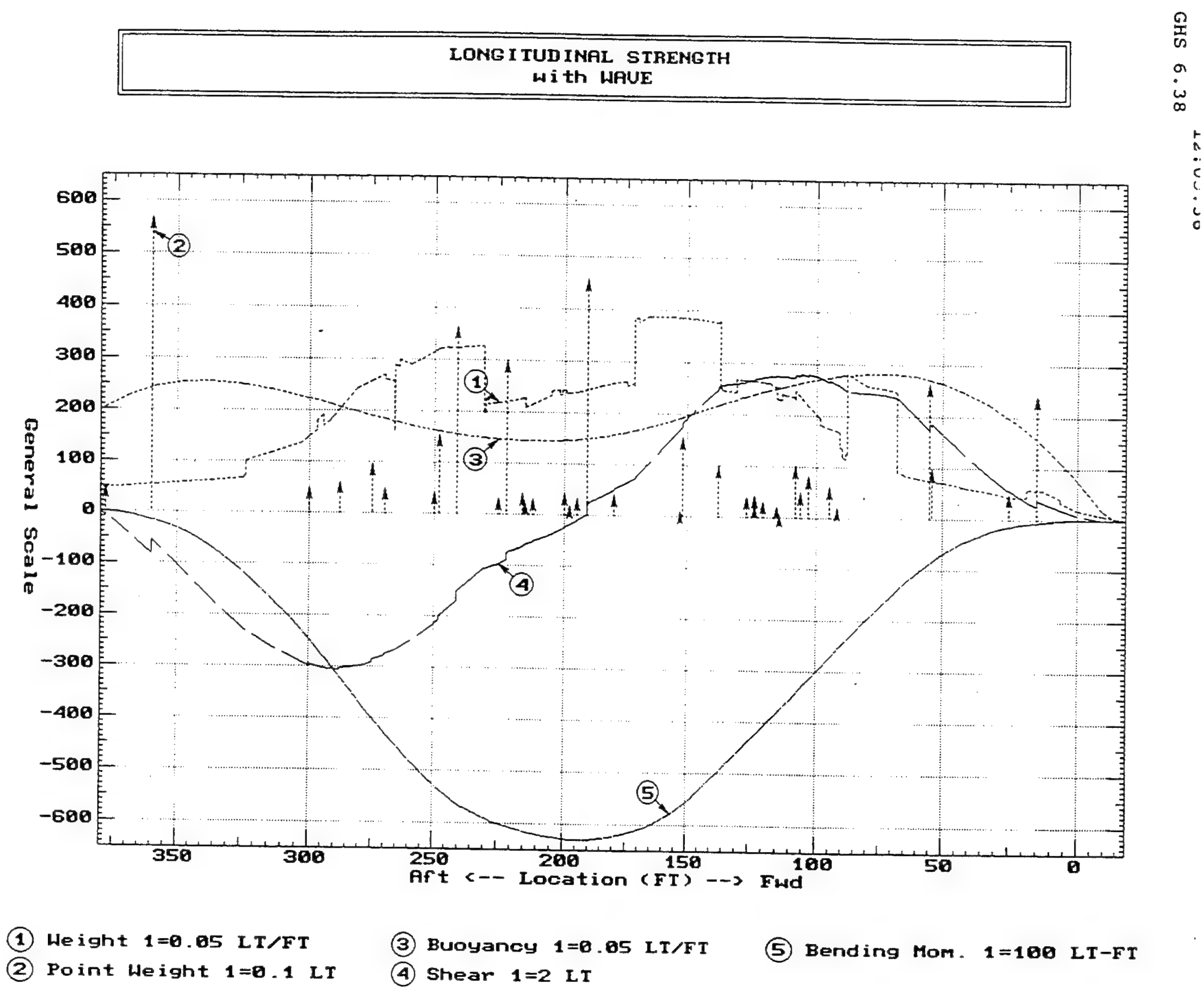


Figure 12 Bending Moment Curve (Sagging)

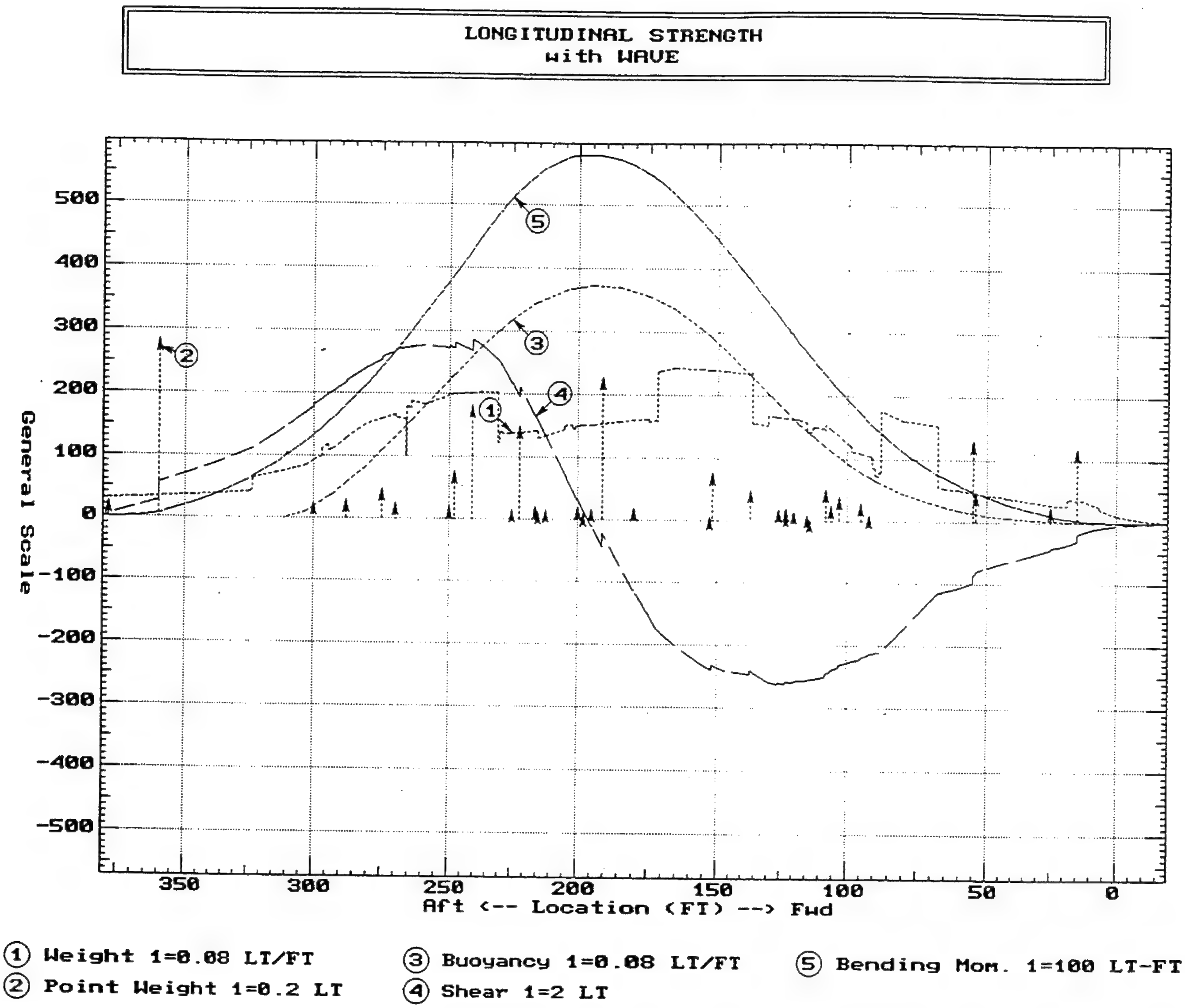


Figure 13 Bending Moment Curve (Hogging)

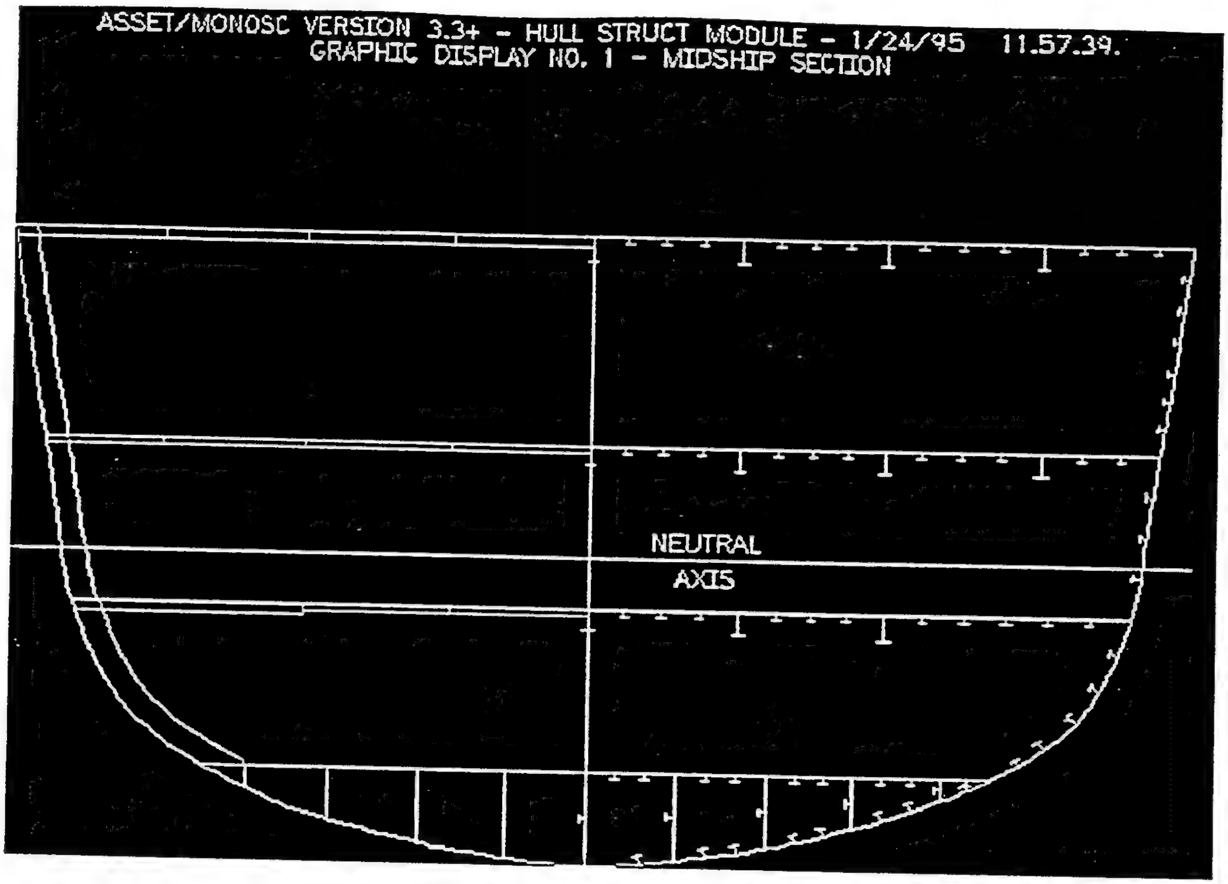


Figure 14 Midship Section

E. DETAILED DRAWINGS

Detailed space arrangements are included for the following spaces as Insert pages (13 through (15).

Combat Information Center 1

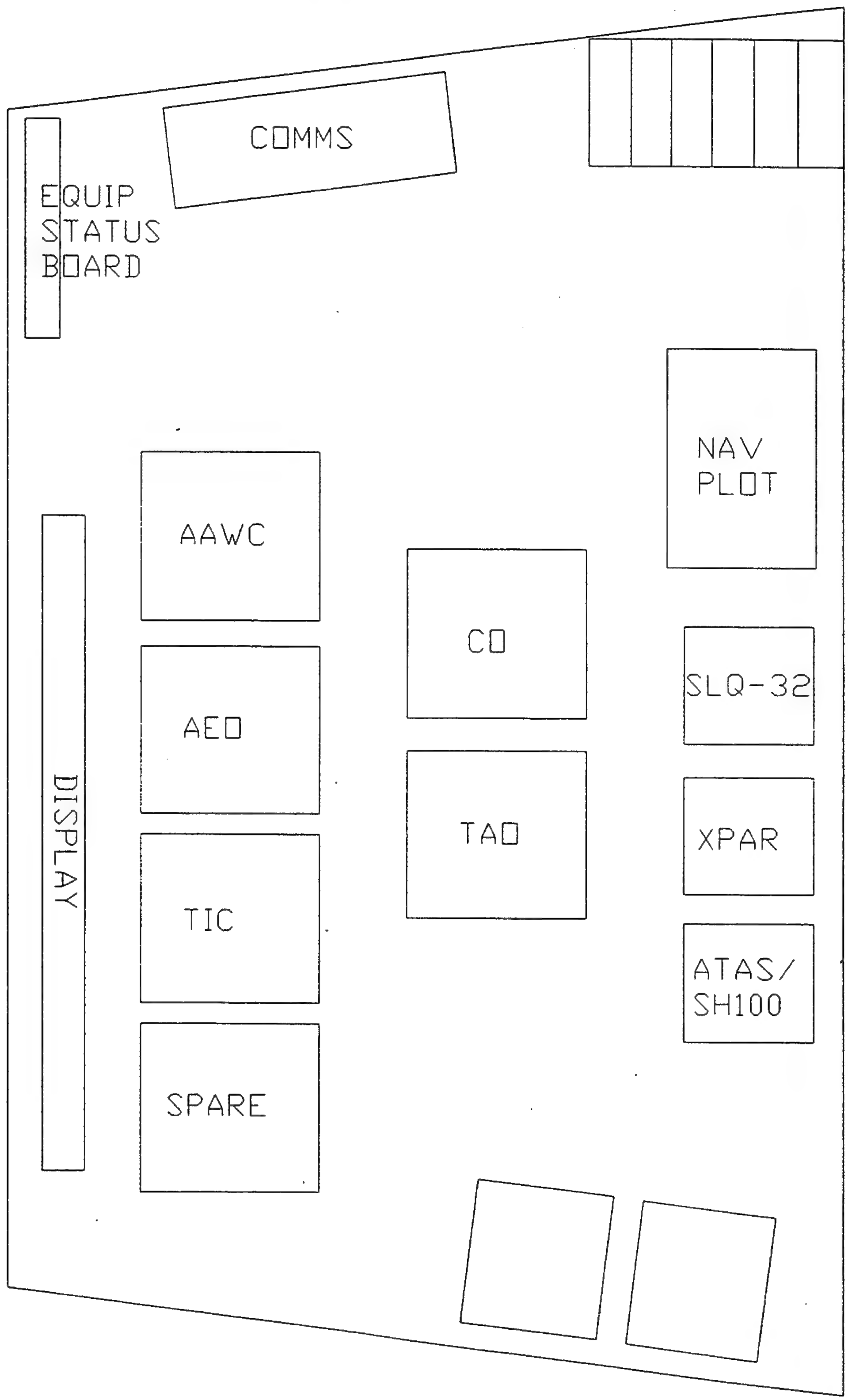
Combat Information Center 2

Pilothouse

Various topside views of the Navy variant are included as Insert pages (16) through (23).

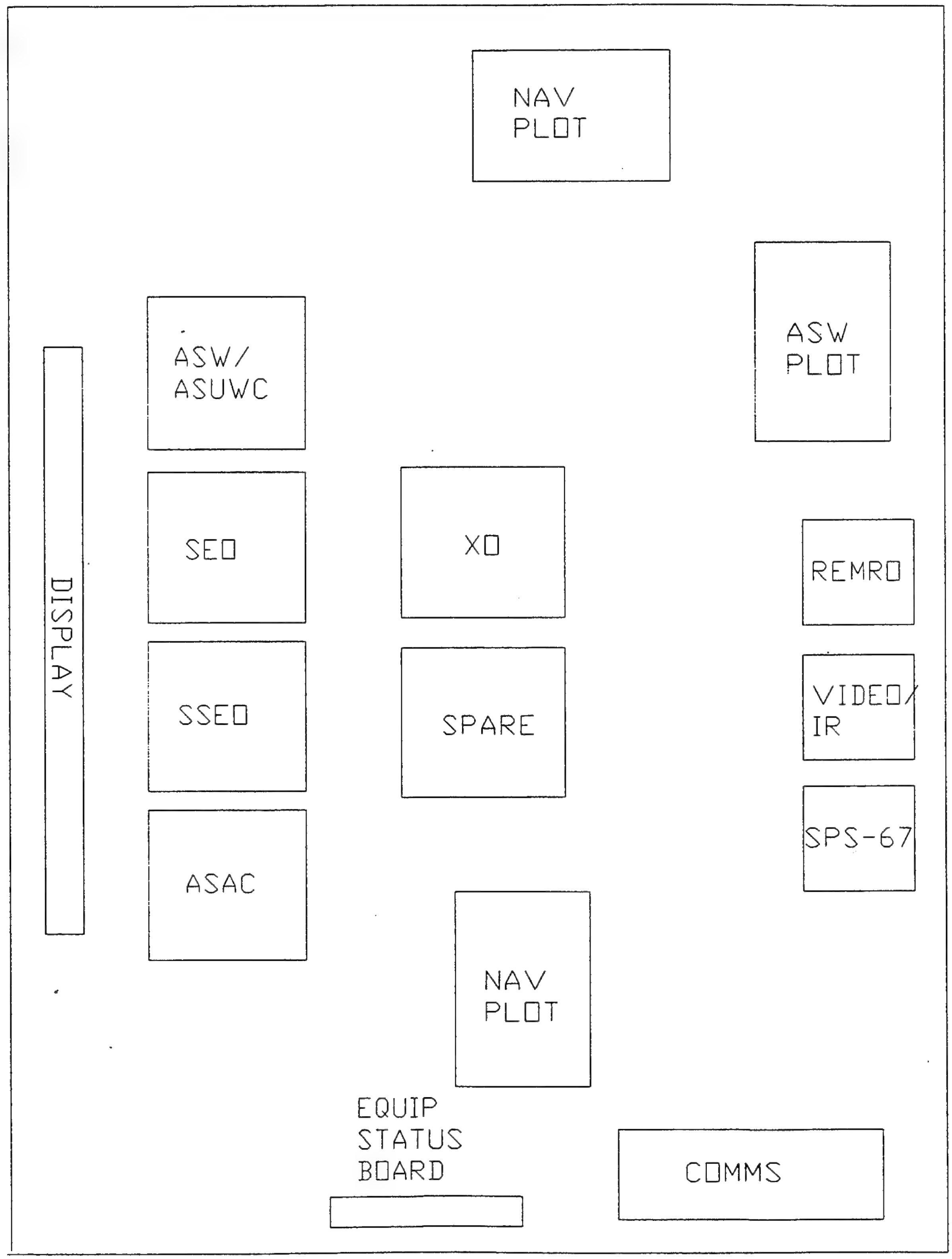
Various topside views of the Coast Guard Variant are included as Insert pages (24) through (30).

CIC #1



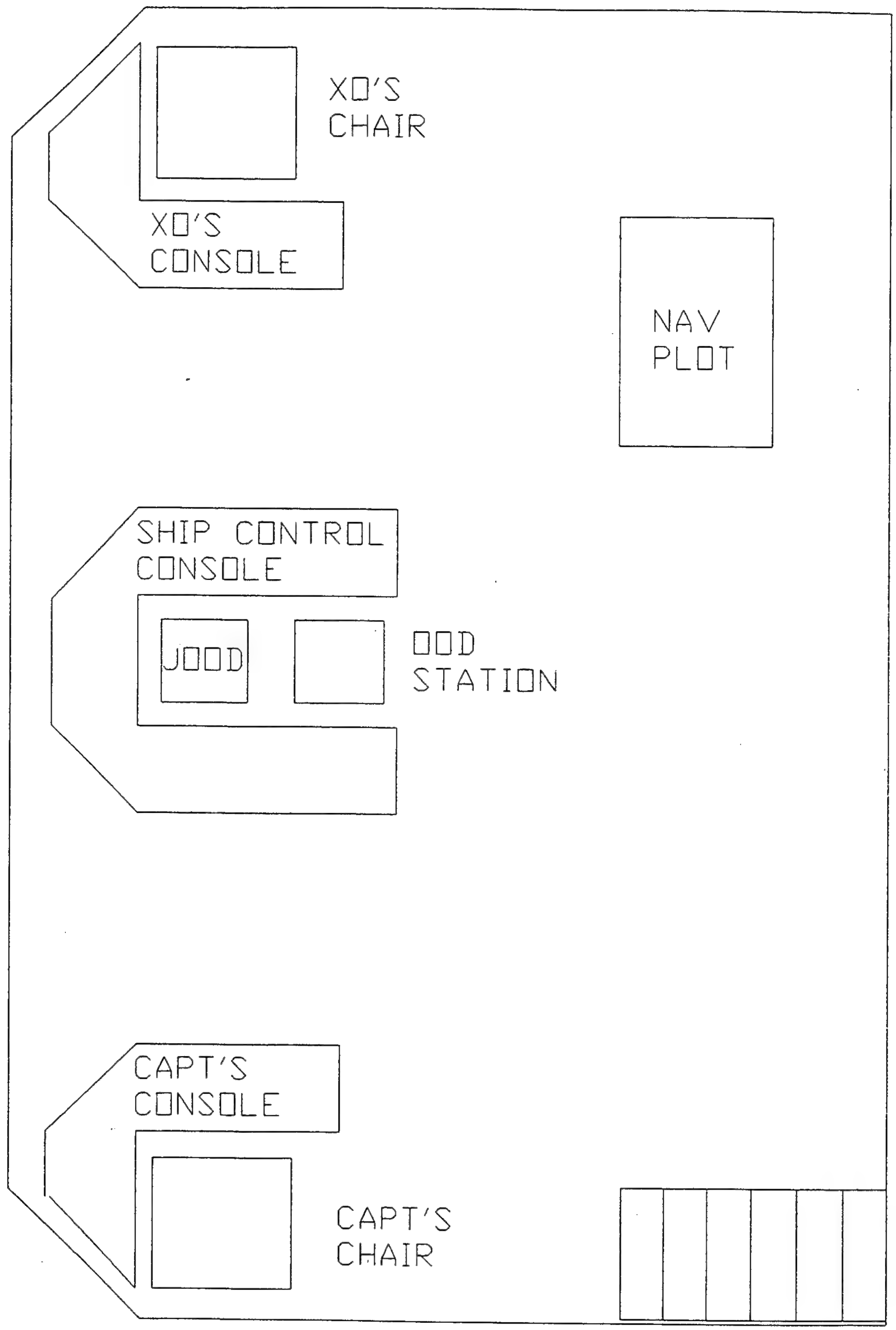
Insert 13

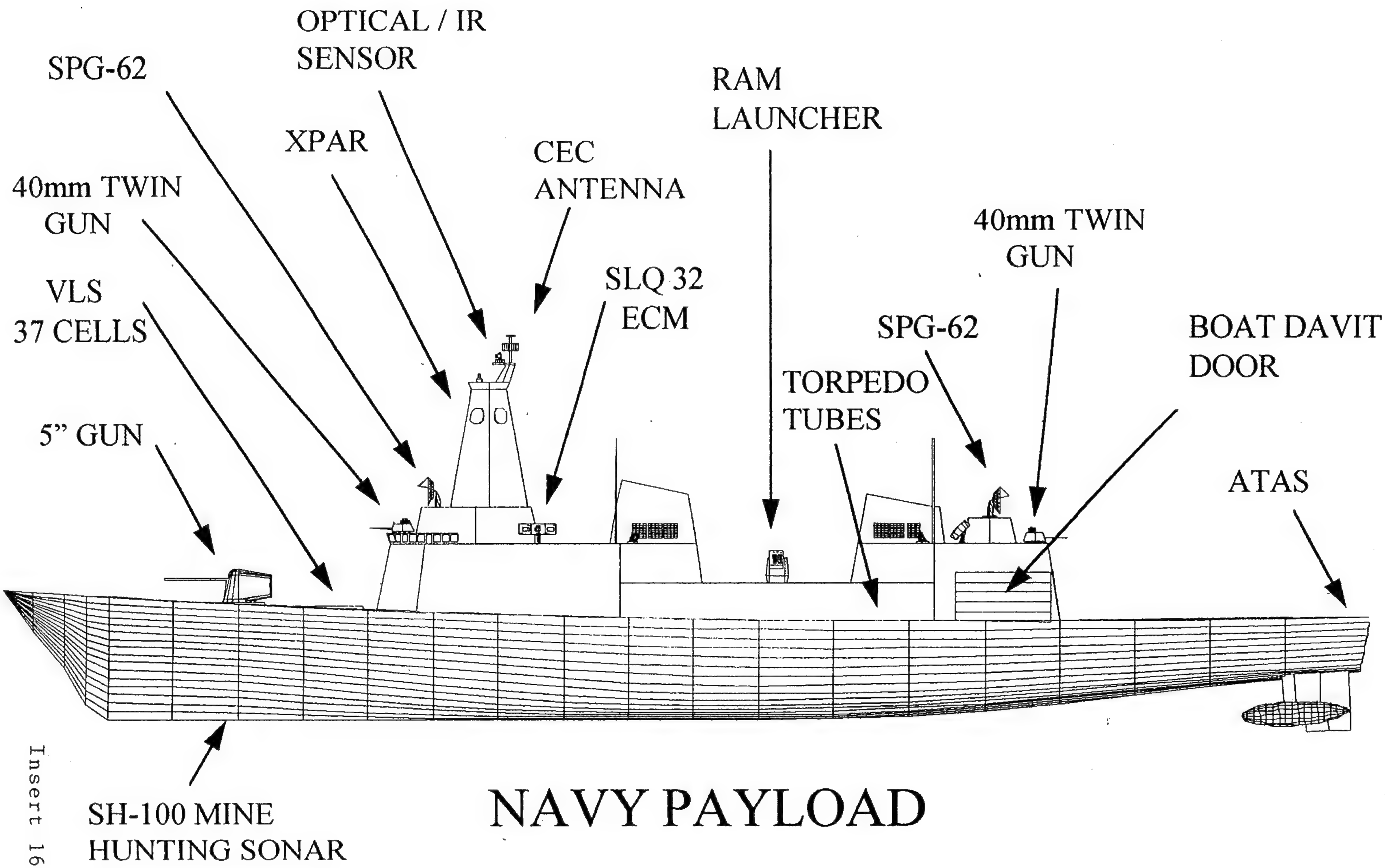
CIC #2



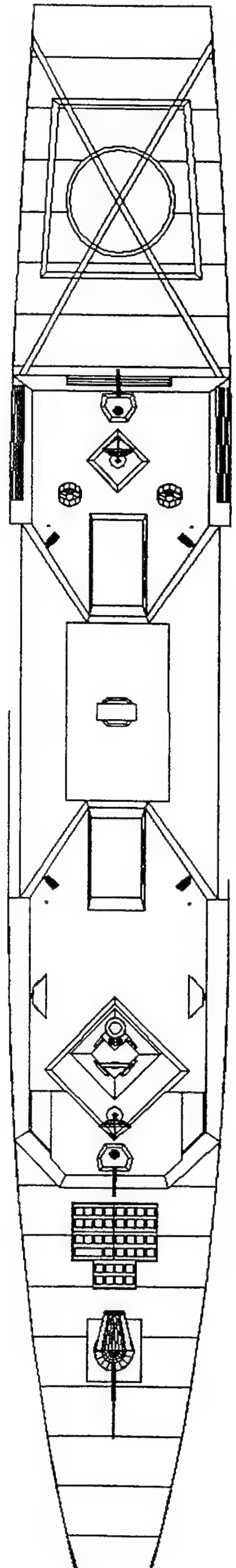
Insert 14

BRIDGE


XO'S
CHAIR
XO'S
CONSOLE
NAV
PLOT
SHIP CONTROL
CONSOLE
JOOD
OOD
STATION
CAPT'S
CONSOLE
CAPT'S
CHAIR



NAVY PAYLOAD



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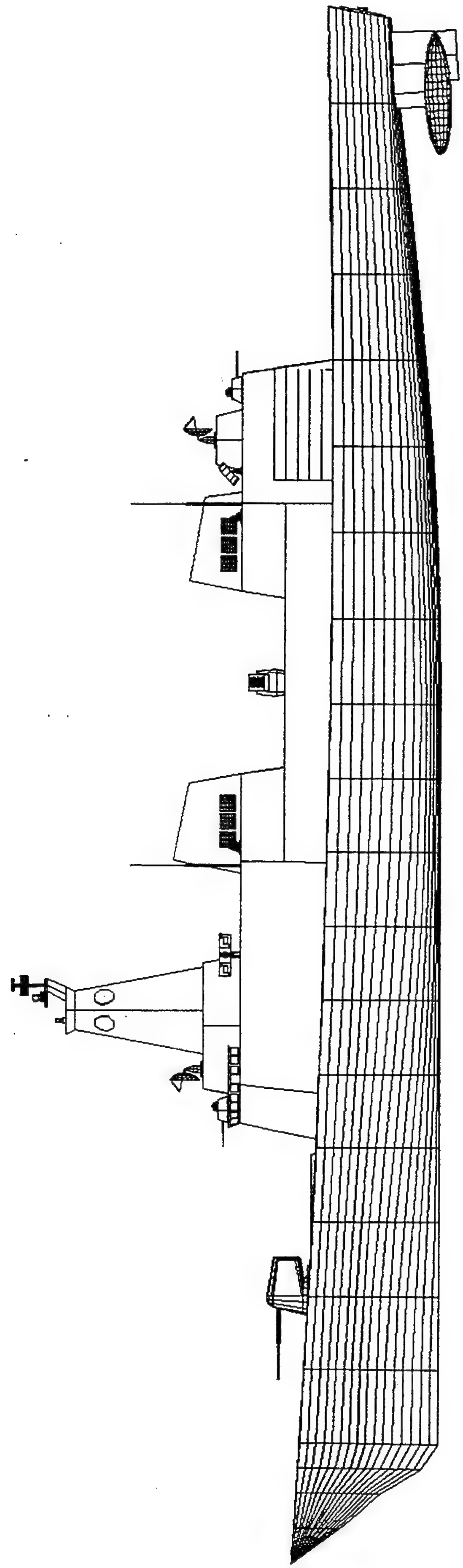

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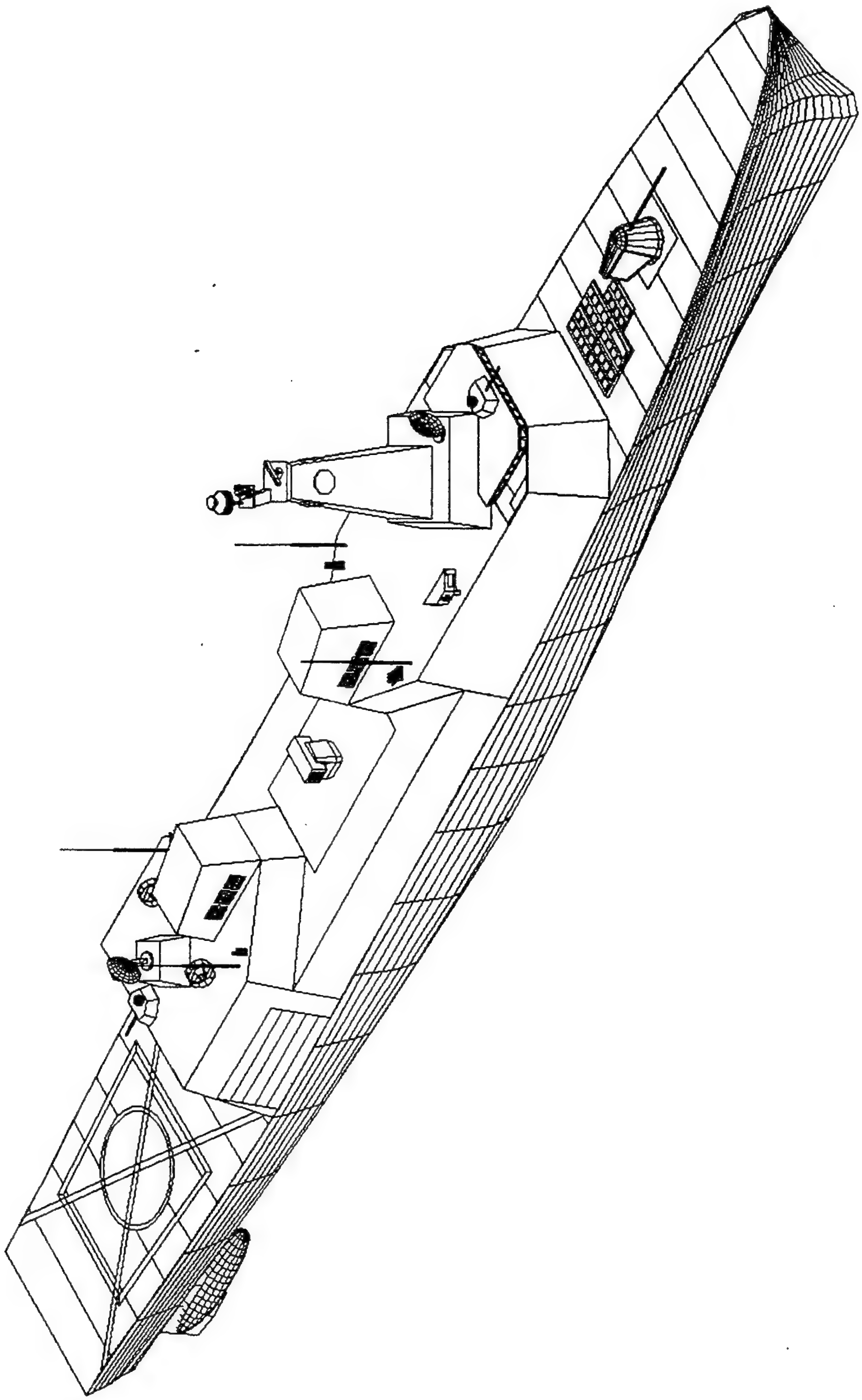

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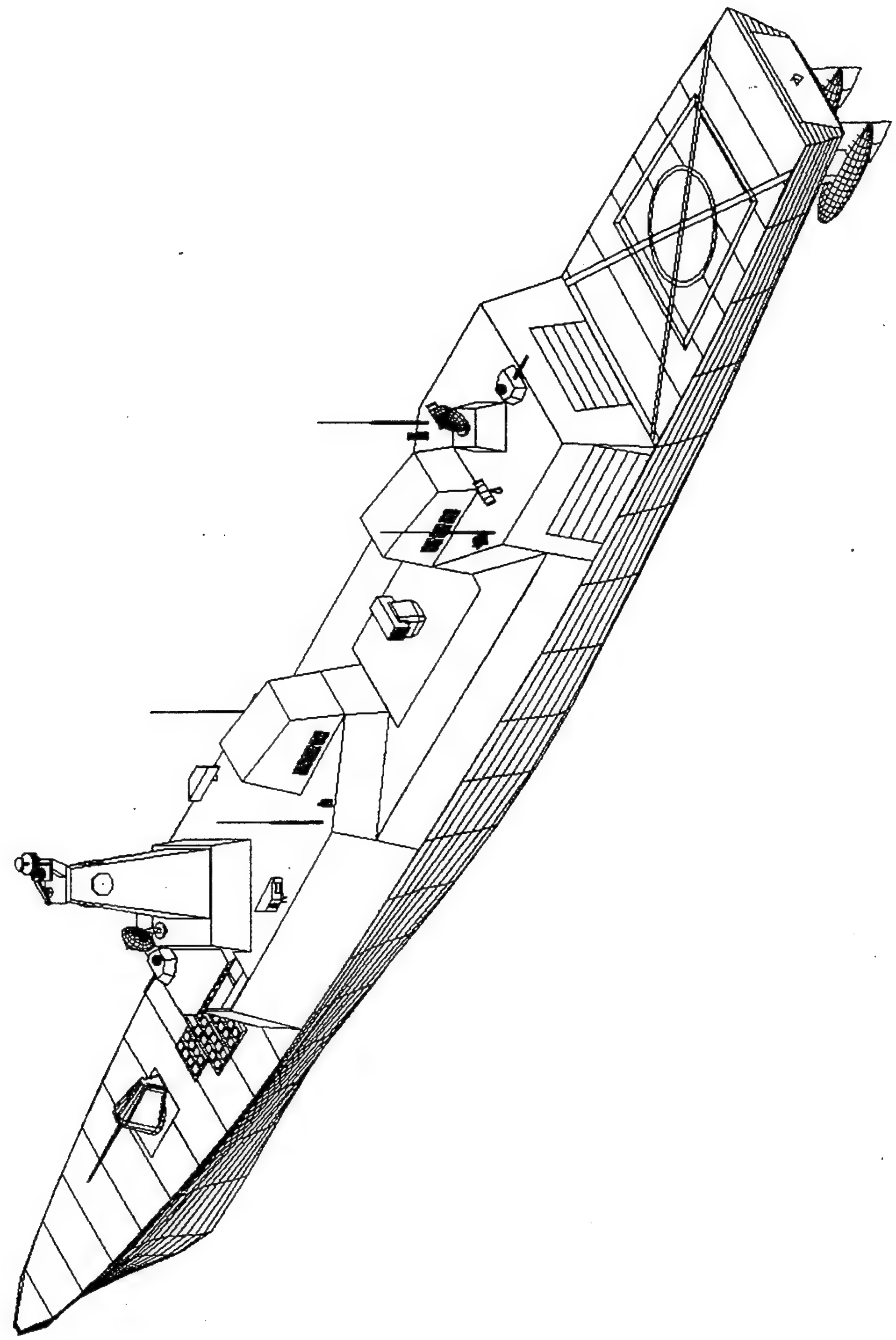

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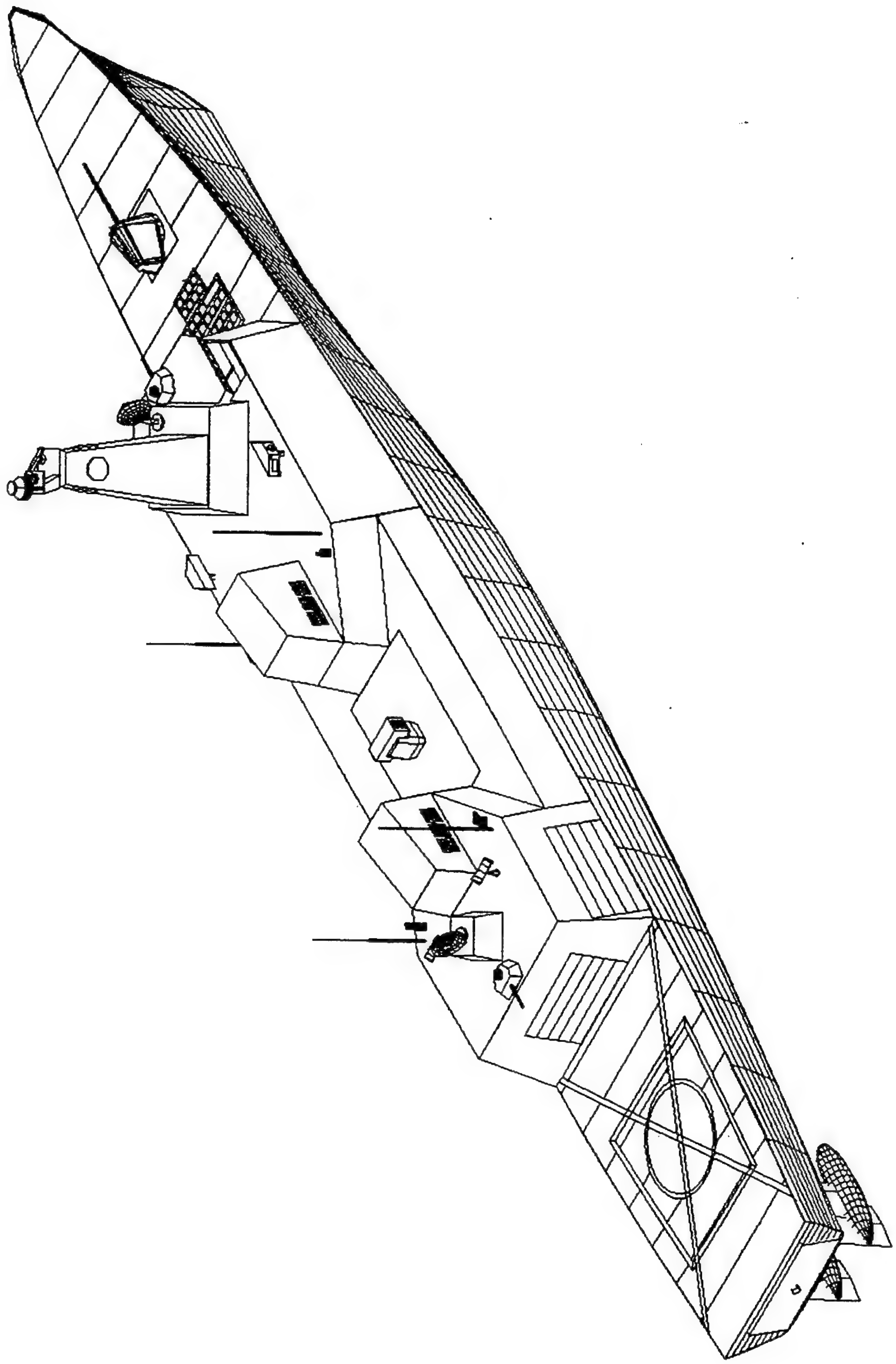

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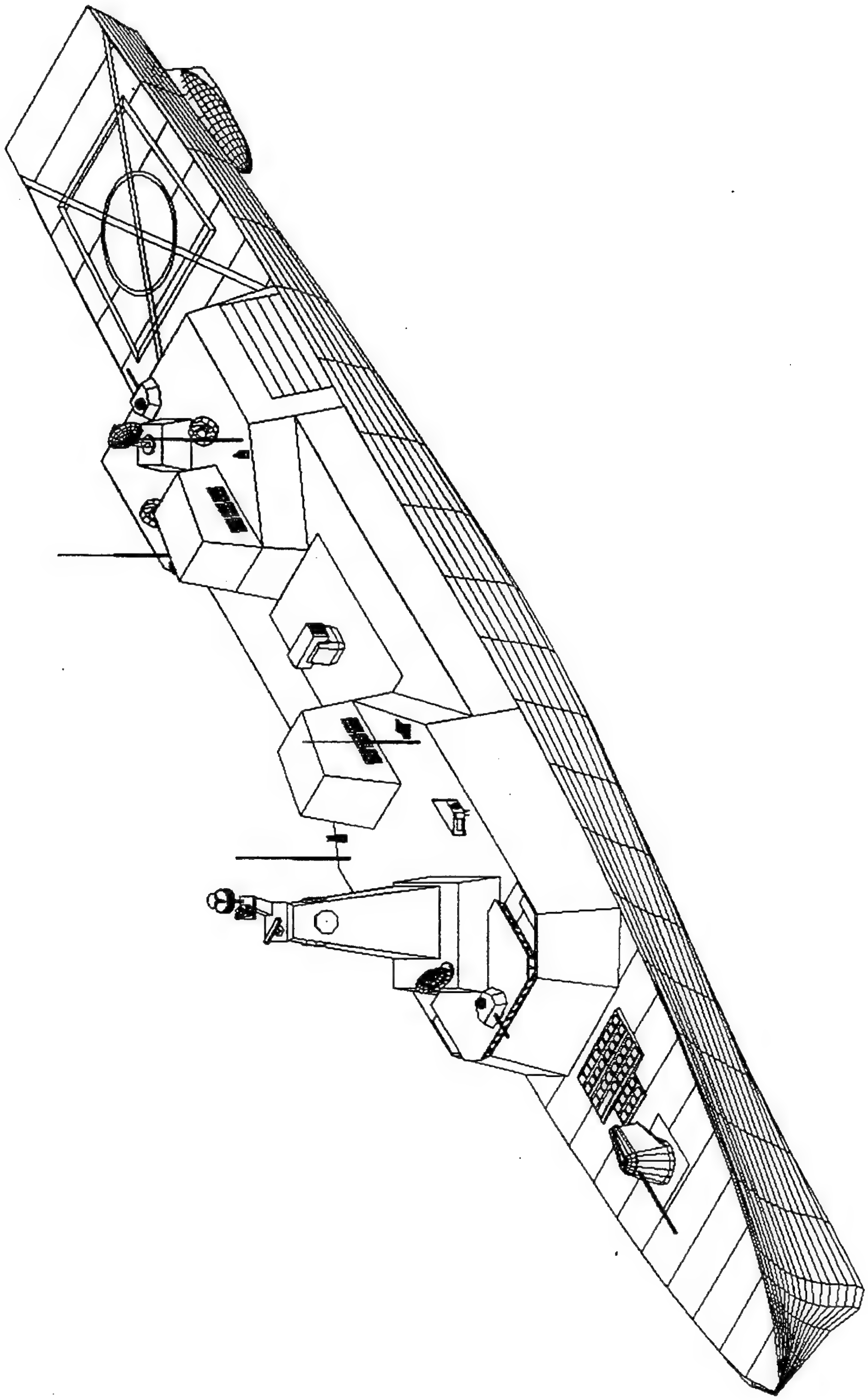
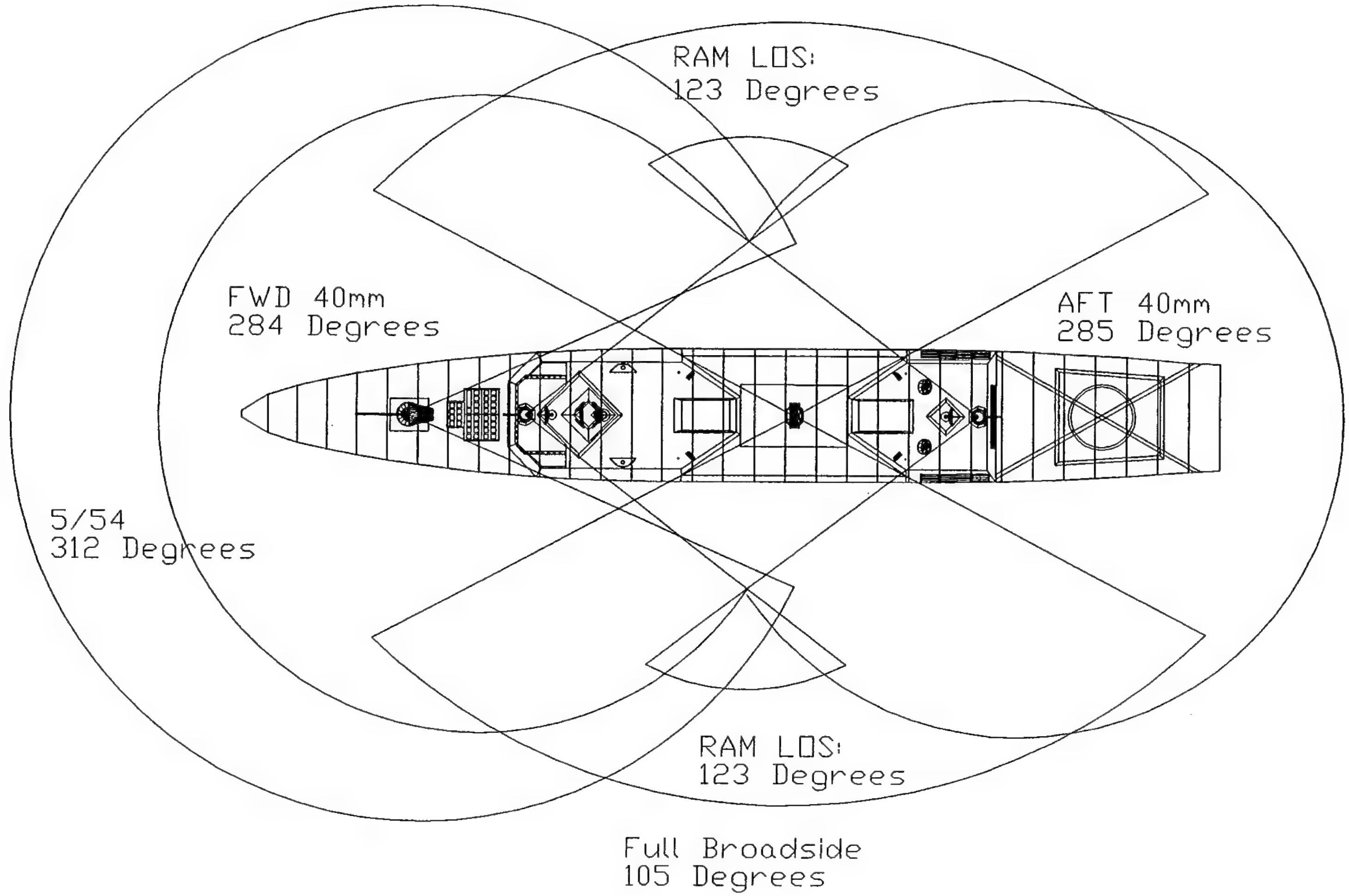
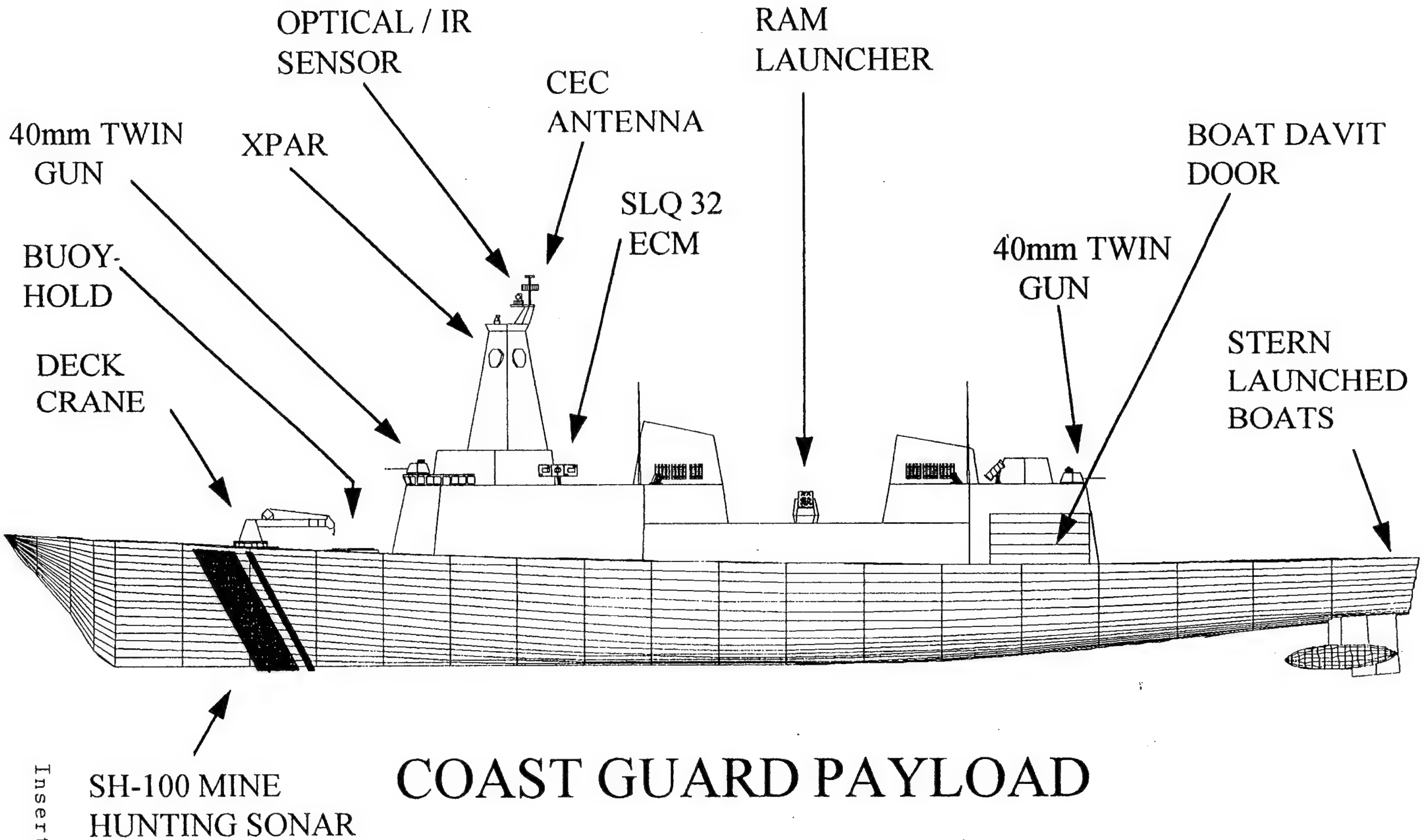


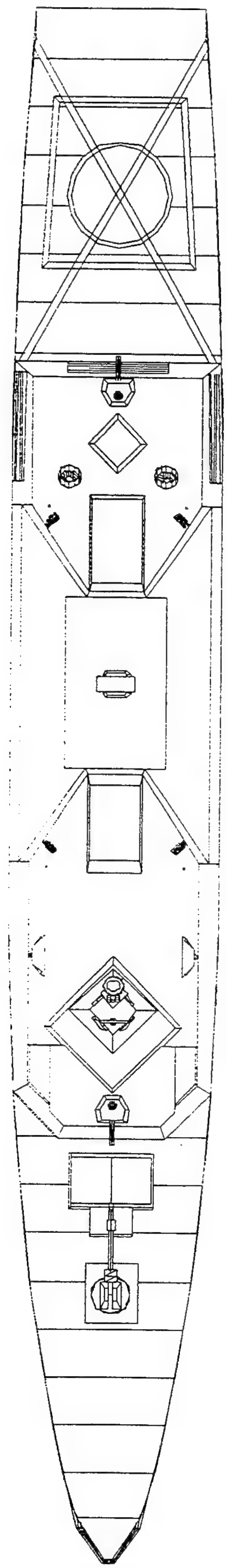
Insert 22

Weapons Coverage Arcs





COAST GUARD PAYLOAD



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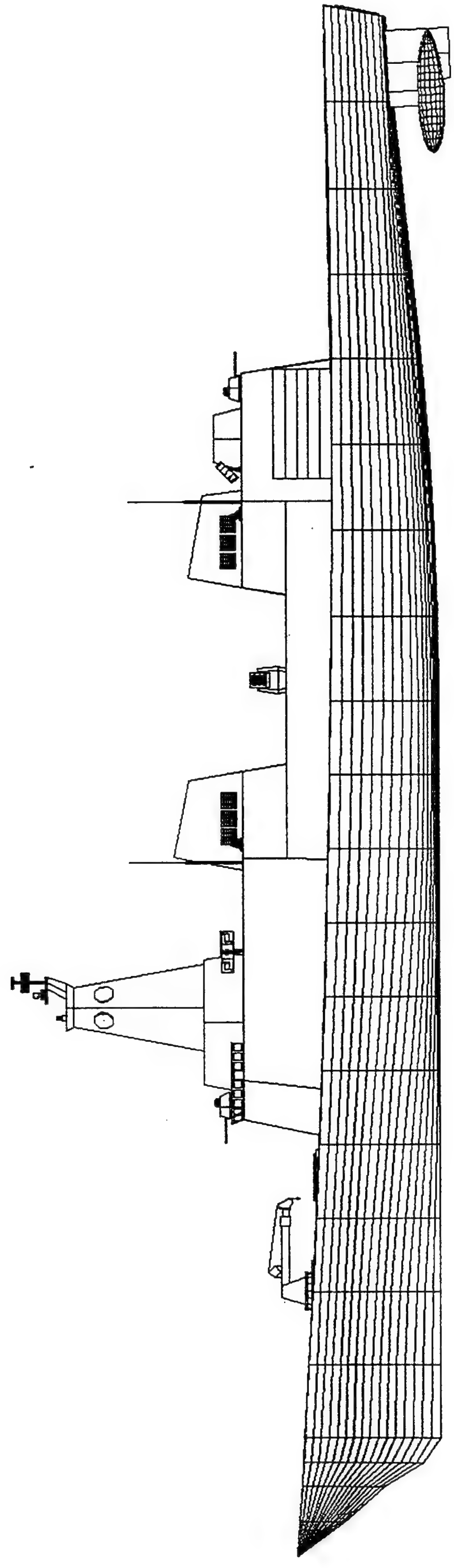

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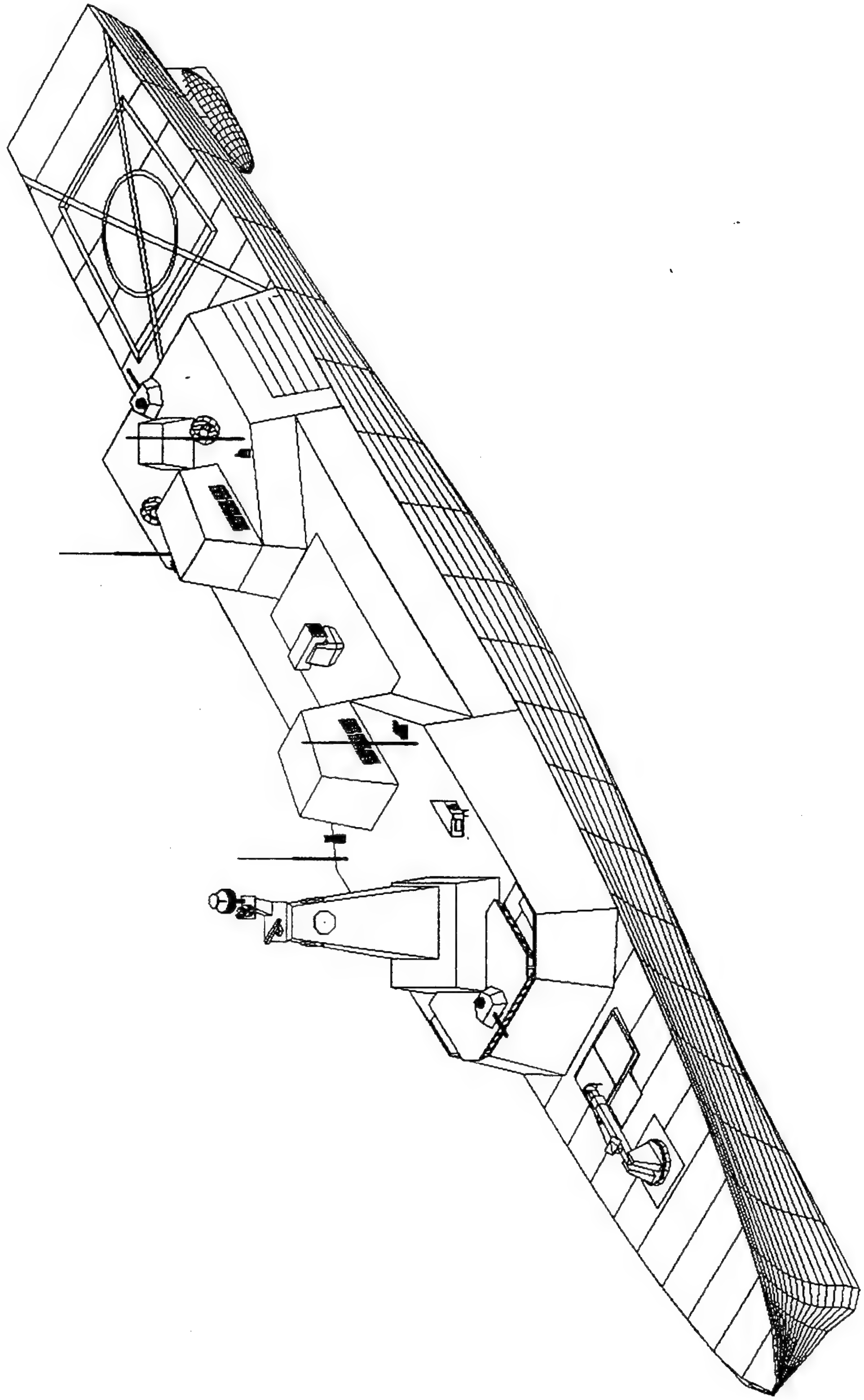

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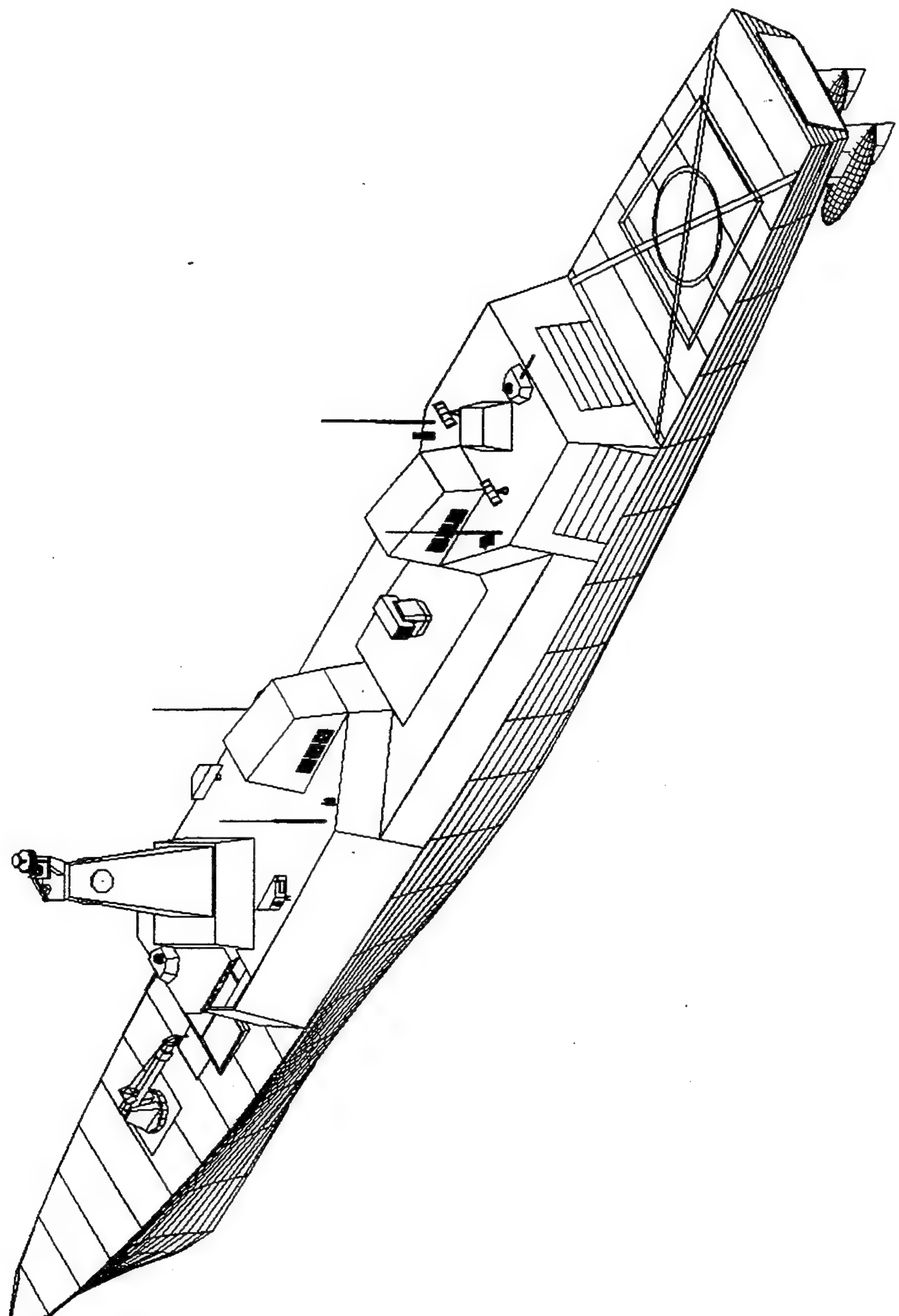

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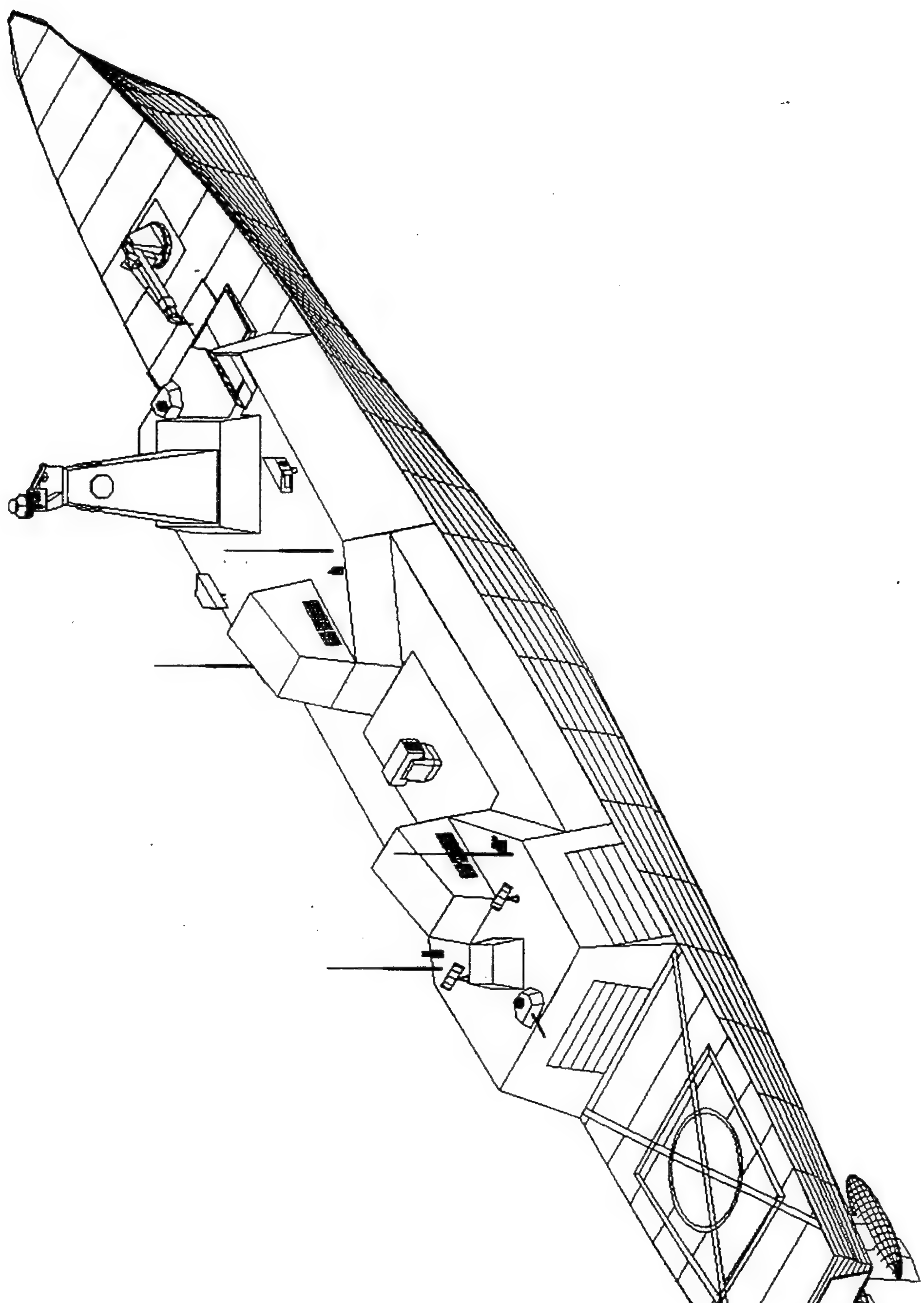

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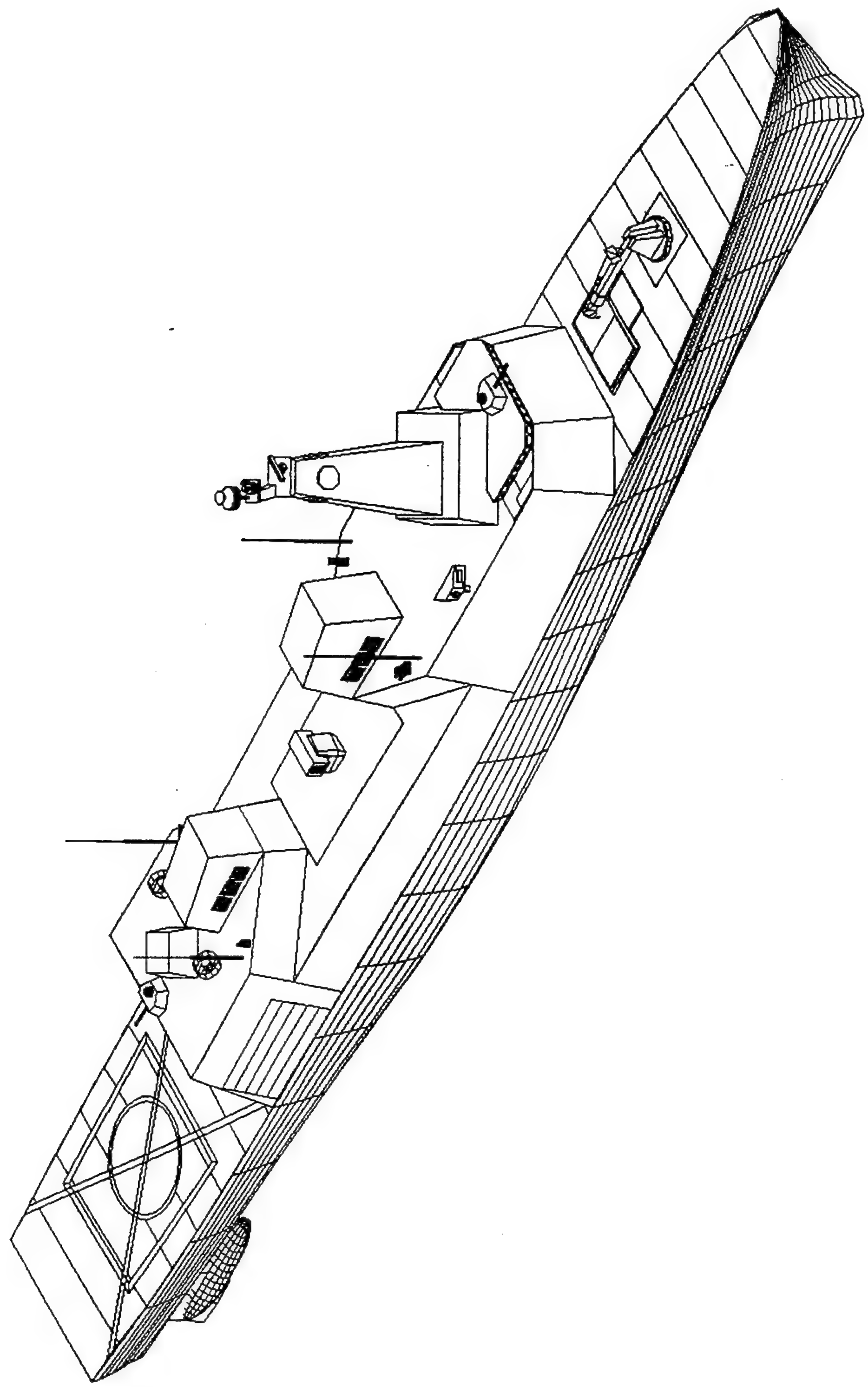

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F. MANNING AND BATTLE ORGANIZATION

1. MANNING

With the requirement of a significant reduction in crew compared to current standards, each position was critically analyzed. Our manning figures were driven by watchstation requirements during General Quarters Condition 1. Two points contributed to our reduction of crew; Service, pay, and health records will be maintained ashore, and major preventative maintenance will be accomplished by shore facilities. Based on our own shipboard experience and our level of automation, these numbers were developed. The manning levels and ratings are included as Tables 1 and 2. Additionally Figures (15) and (16) show the departmental organizational charts for the Navy and Coast Guard. Although this is not a formal manning document, it is an attempt to determine the number of personnel required to man the ship

Navy Variant

DEPARTMENT	OFFICERS	CPO'S	ENLISTED	TOTAL
SHIP SUPPORT	CO, XO, SUPPO (3)	HMC, MSC (2)	MS (3), SH(2) SK(2), YN/PN (8)	13
COMBAT SYSTEMS	CSO,OPS,EMO, WEPS (4)	BMC, ETC, FCC, GMC, OSC, RMC,STC (7)	BM (8), ET (4), EW (3), FC (4), GM (4), OS (8), QM (2), RM (4), SM, ST (2), TM, (41)	52
ENGINEERING	CHENG, MPA, DCA, A&E (4)	EMC, ENC, GSC, HTC/DCC (4)	EM (6), EN (7), GS (7), HT/DC (4), MM (2) (26)	34
AIR DETACHMENT	PILOTS (4)	ATC (1)	AIR CREW AIR TECHS (6)	11
AVAILABLE MANNING	15	14	81	110

Table 1

Coast Guard Variant

DEPARTMENT	OFFICERS	CPO'S	ENLISTED	TOTAL
SHIP SUPPORT	CO, XO, SUPPO (3)	HSC, SKC, SSC (3)	SS (5), SK(2), YN/PN (8)	14
COMBAT SYSTEMS	CSO,CICO, WEPS (3)	ETC, FTC, RMC, RDC (4)	ET (5), FT (2), GM (4), RD (8), RM (5) (24)	31
OPERATIONS	OPS 1ST LT (2)	BMC, QMC (2)	BM (14), QM (3) (17)	21
ENGINEERING	EO, MPA, DCA, A&E (4)	EMC, MKC (2), DCC (4)	EM (6), MK (16), DC (4) (26)	34
AIR DETACHMENT	PILOTS (2)	(0)	AIR CREW AIR TECHS (4)	6
AVAILABLE MANNING	14	13	79	106

Table 2

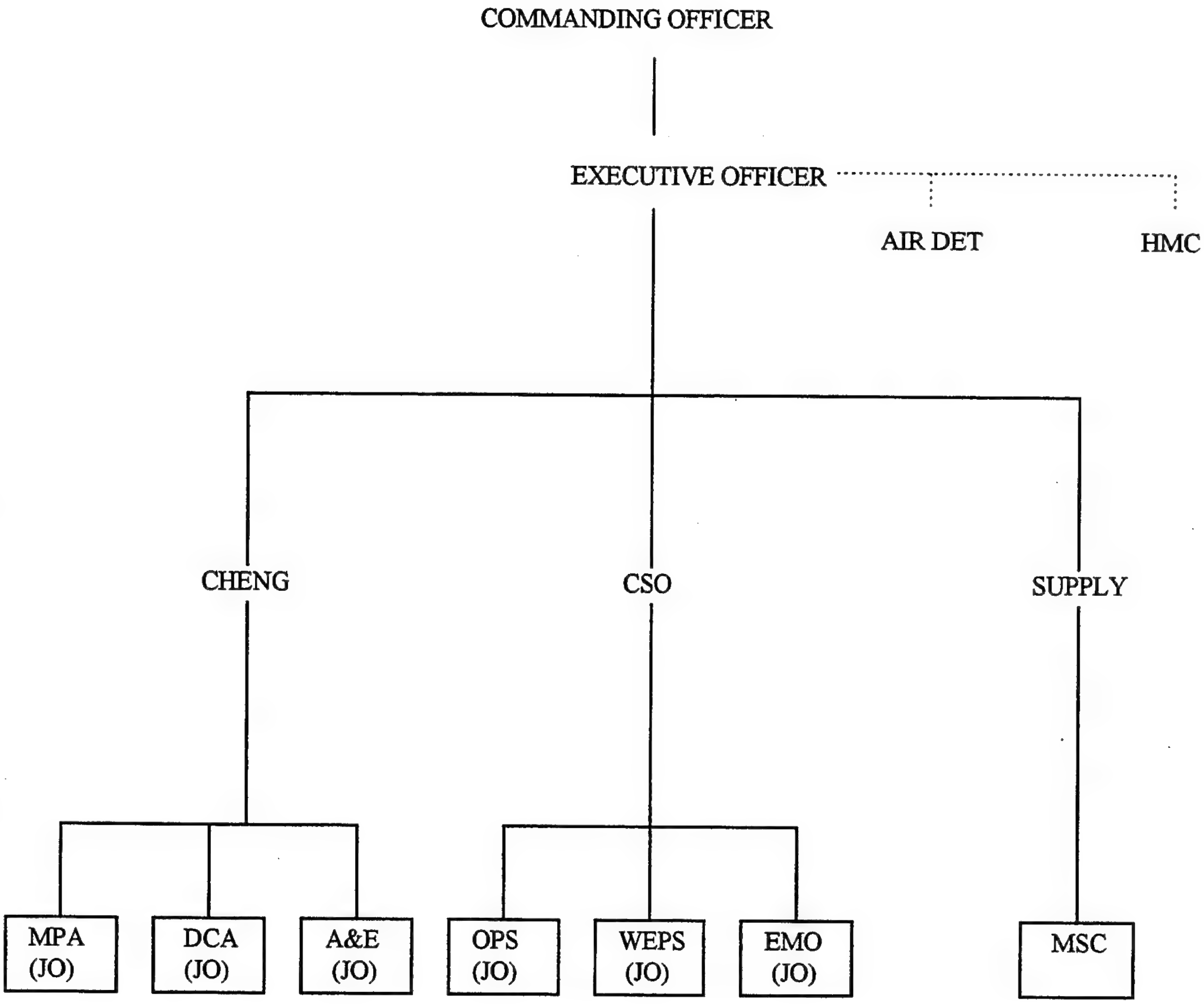


Figure 15 DEPARTMENTAL ORGANIZATION - NAVY

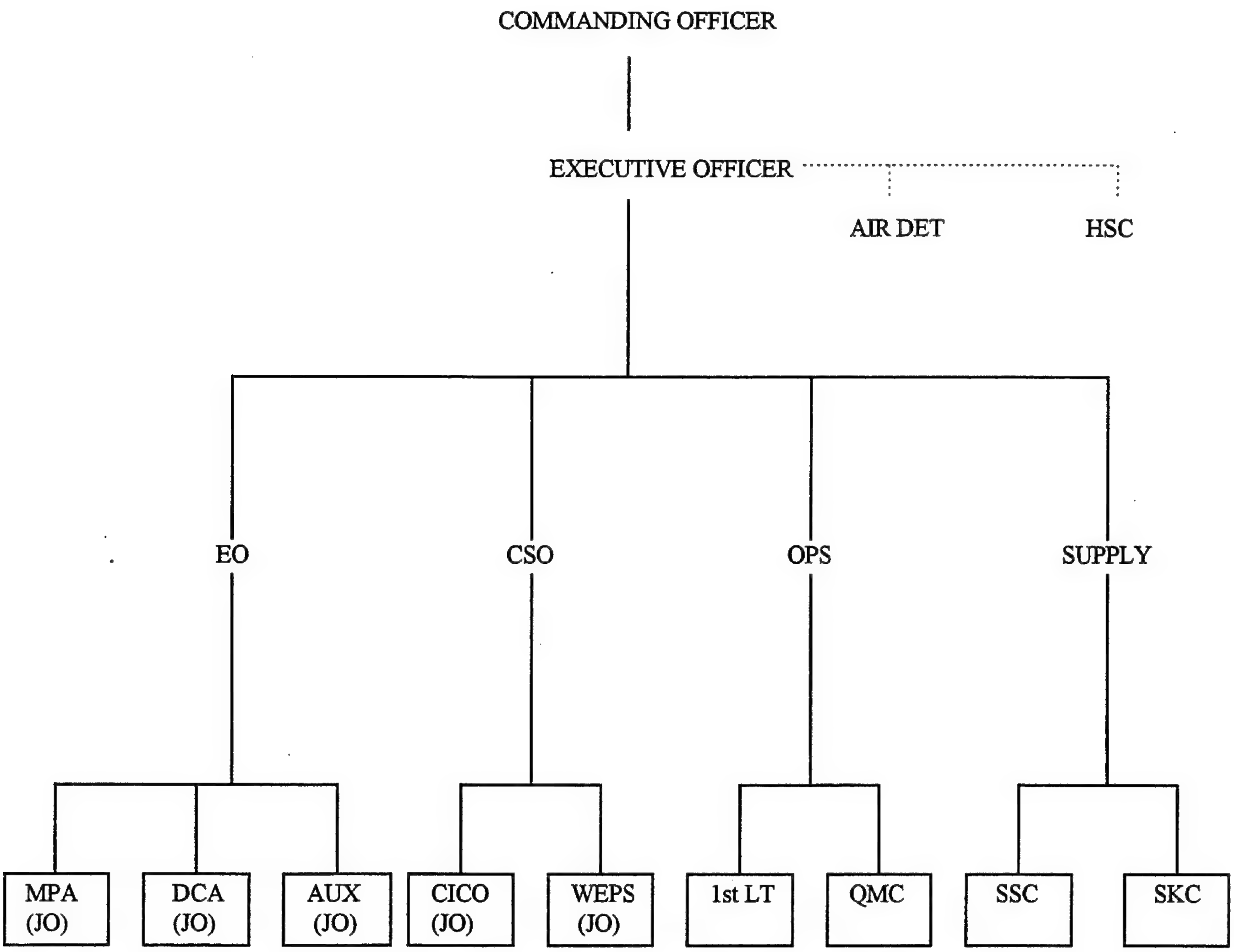


Figure 16 DEPARTMENTAL ORGANIZATION - COAST GUARD

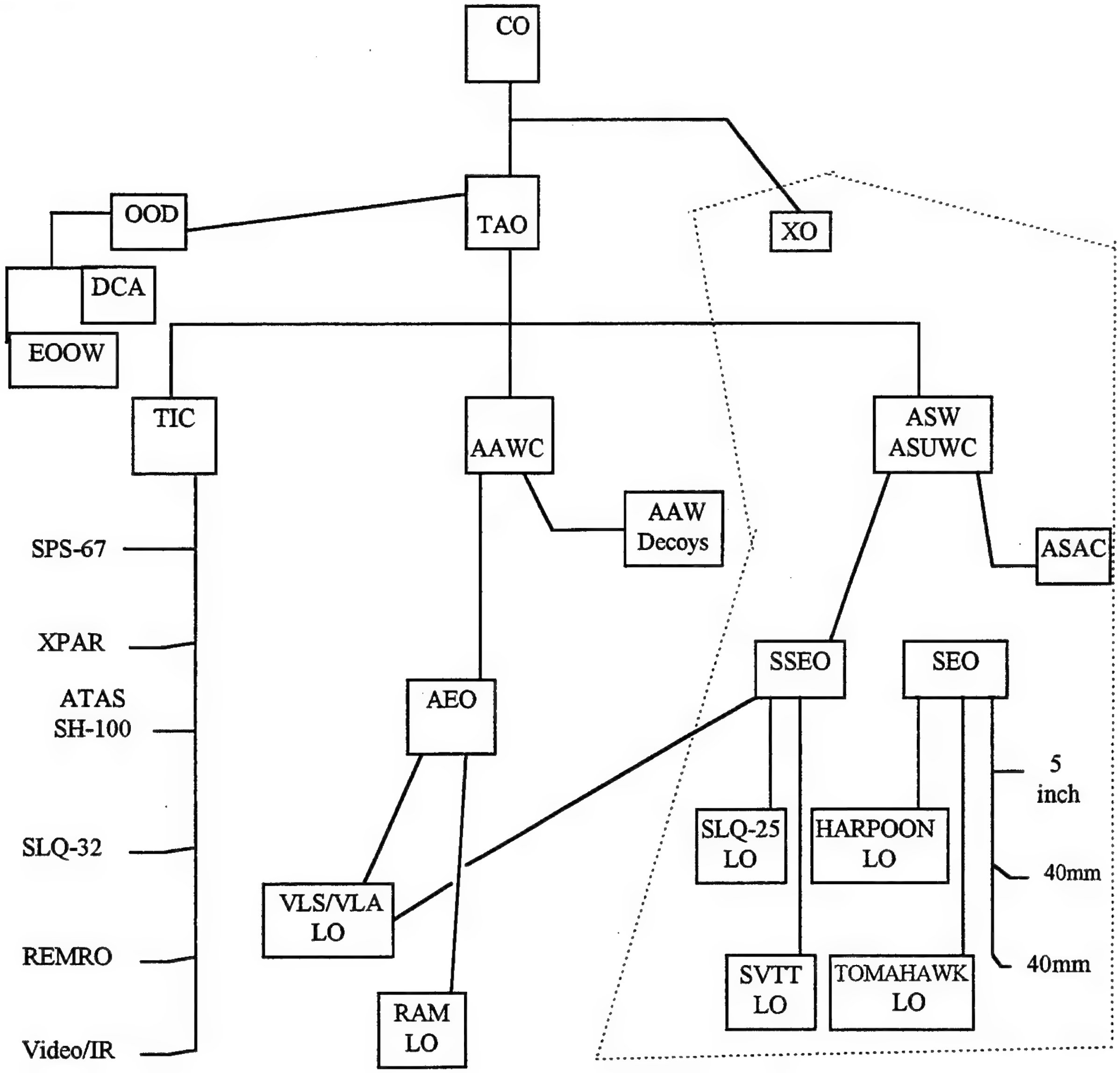
2. *BATTLE ORGANIZATION*

The manning requirements for the ship drive many design parameters, especially in the Combat System area. Manning is primarily driven by watchstation requirements during battle conditions, and to a lesser extent by normal ship operations. The CPCX's Condition I and Condition III Battle Organizations are given in Figures 17 and 18 and 19 and 20 respectively. The connectivity of the watch organization is for supervisory functions only, and has nothing to do with the flow of information to each watch station. Since each watch station will be connected to the data multiplexed ring bus, all watch stations will have access to any desired information. The watch stations that require consoles will be established with either one of two different types:

(a) a multi-purpose console (MMI) capable of performing any watch station function.

(b) or a watch station specific console used only for local equipment control and specific functions.

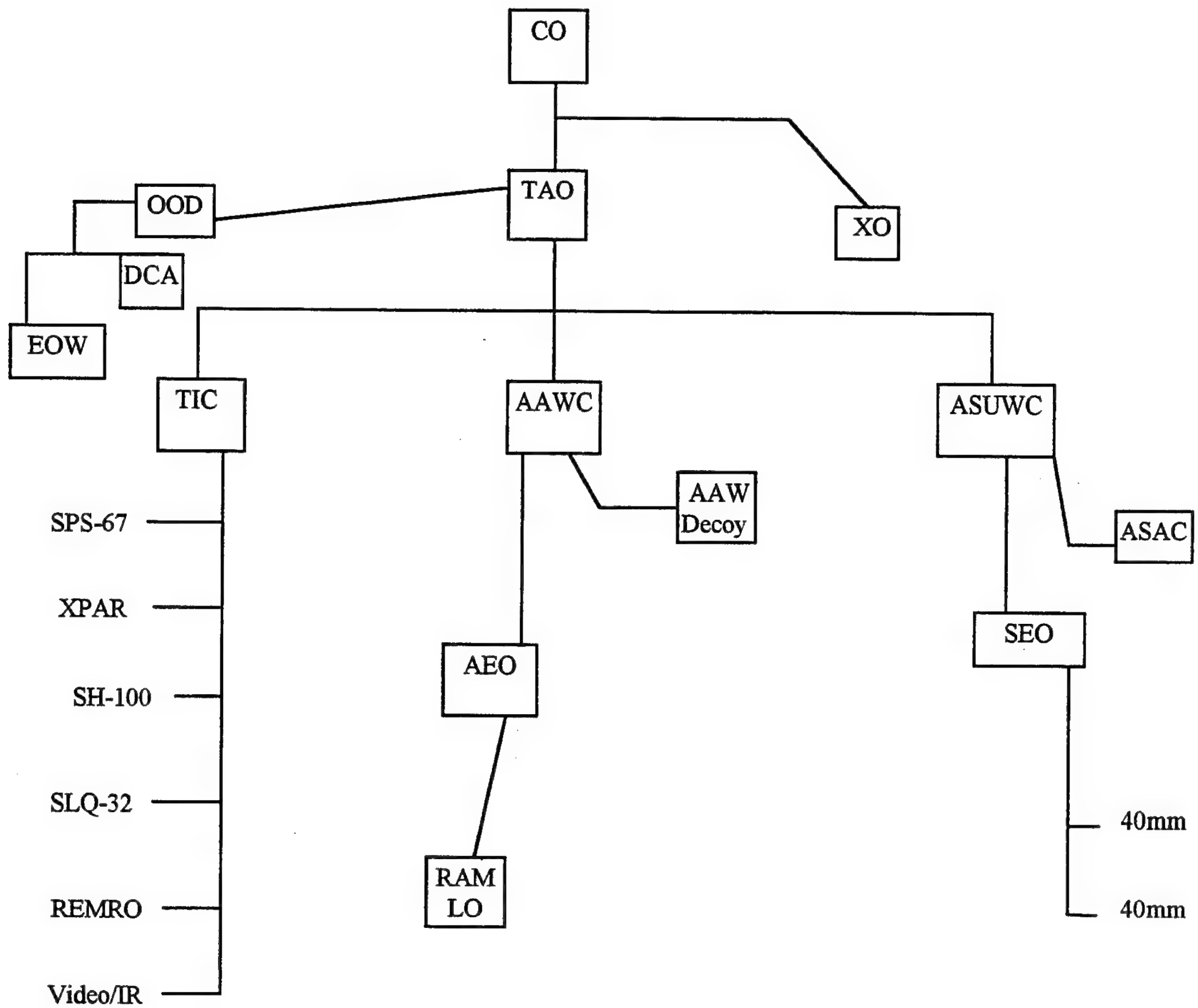
The capability of the combat system watch team during Condition III is that it can fight the ship in a short duration , limited capacity until the ship can man Condition I watch stations. The CPCX's manning will allow, with the exception of radio, all watch stations to be stood in a three section, 4 hours on/8 hours off, watch rotation. This will allow ample time for the off watch sections to conduct training, maintenance and housekeeping.



LEGEND

AAWC	**ANTI-AIR WARFARE COORDINATOR**
ASAC	**ANTI-SUBMARINE AIRCRAFT CONTROLLER**
ASUWC	**ANTI-SURFACE WARFARE COORDINATOR**
ASWC	**ANTI-SUBMARINE WARFARE COORDINATOR**
AEO	**AIR ENGAGEMENT OFFICER**
CO	**COMMANDING OFFICER**
DCA	**DAMAGE CONTROL ASSISTANT**
EOOW	**ENGINEERING OFFICER THE WATCH**
OOD	**OFFICER OF THE DECK**
LO	**LOCAL OPERATOR**
SEO	**SURFACE ENGAGEMENT OFFICER**
SSEO	**SUB-SURFACE ENGAGEMENT OFFICER**
TAO	**TACTICAL ACTION OFFICER**
TIC	**TRACK INFORMATION OFFICER**
XO	**EXECUTIVE OFFICER**
----	**CIC 2 (ALTERNATE CIC)**

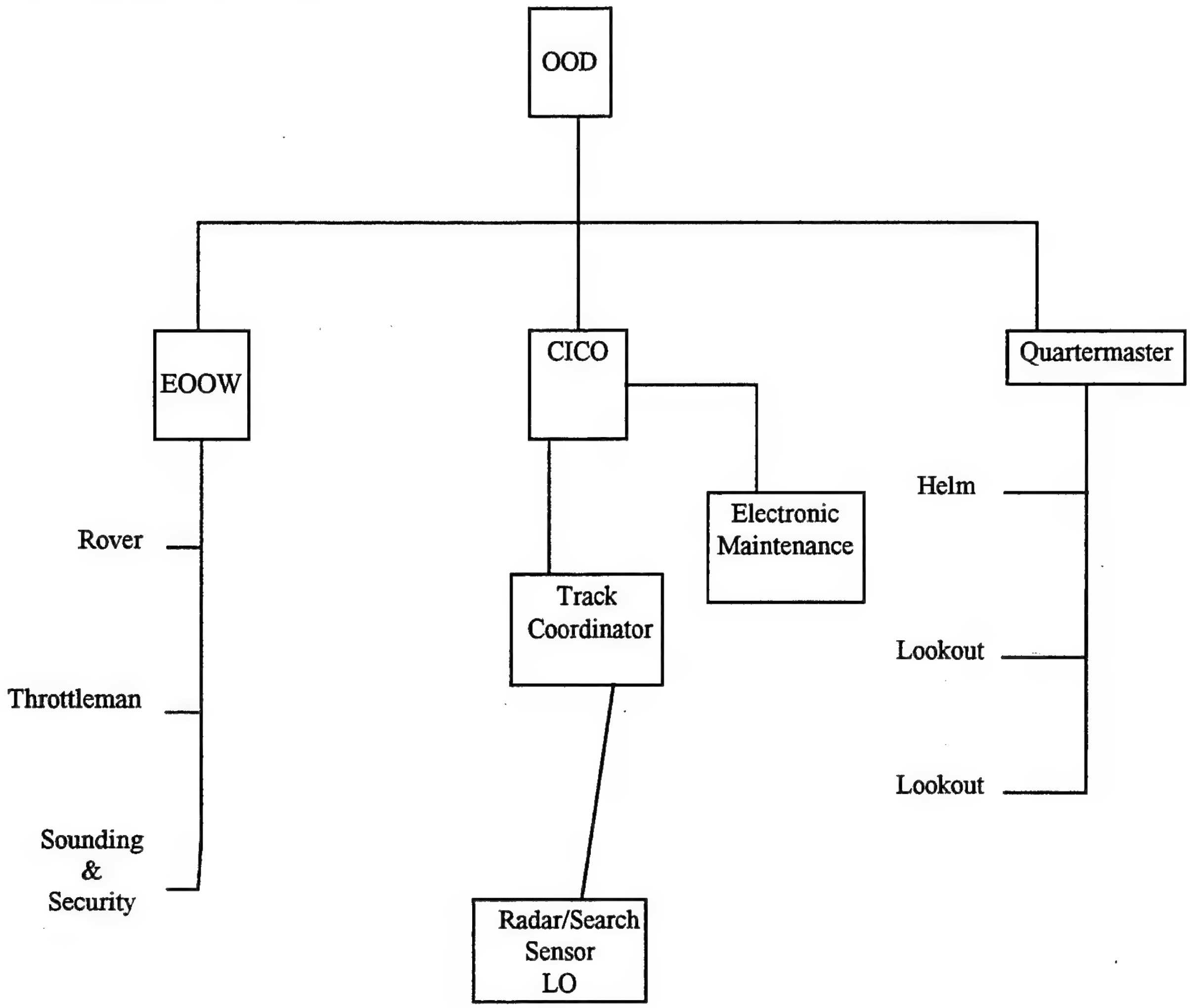
Figure 17 CONDITION I BATTLE ORGANIZATION - NAVY



LEGEND

AAWC	**ANTI-AIR WARFARE COORDINATOR**
ASAC	**ANTI-SUBMARINE AIRCRAFT CONTROLLER**
ASUWC	**ANTI-SURFACE WARFARE COORDINATOR**
AEO	**AIR ENGAGEMENT OFFICER**
DCA	**DAMAGE CONTROL ASSISTANT**
EOW	**ENGINEER OF THE WATCH**
CO	**COMMANDING OFFICER**
LO	**LOCAL OPERATOR**
OOD	**OFFICER OF THE DECK**
SEO	**SURFACE ENGAGEMENT OFFICER**
TAO	**TACTICAL ACTION OFFICER**
TIC	**TRACK INFORMATION OFFICER**
XO	**EXECUTIVE OFFICER**

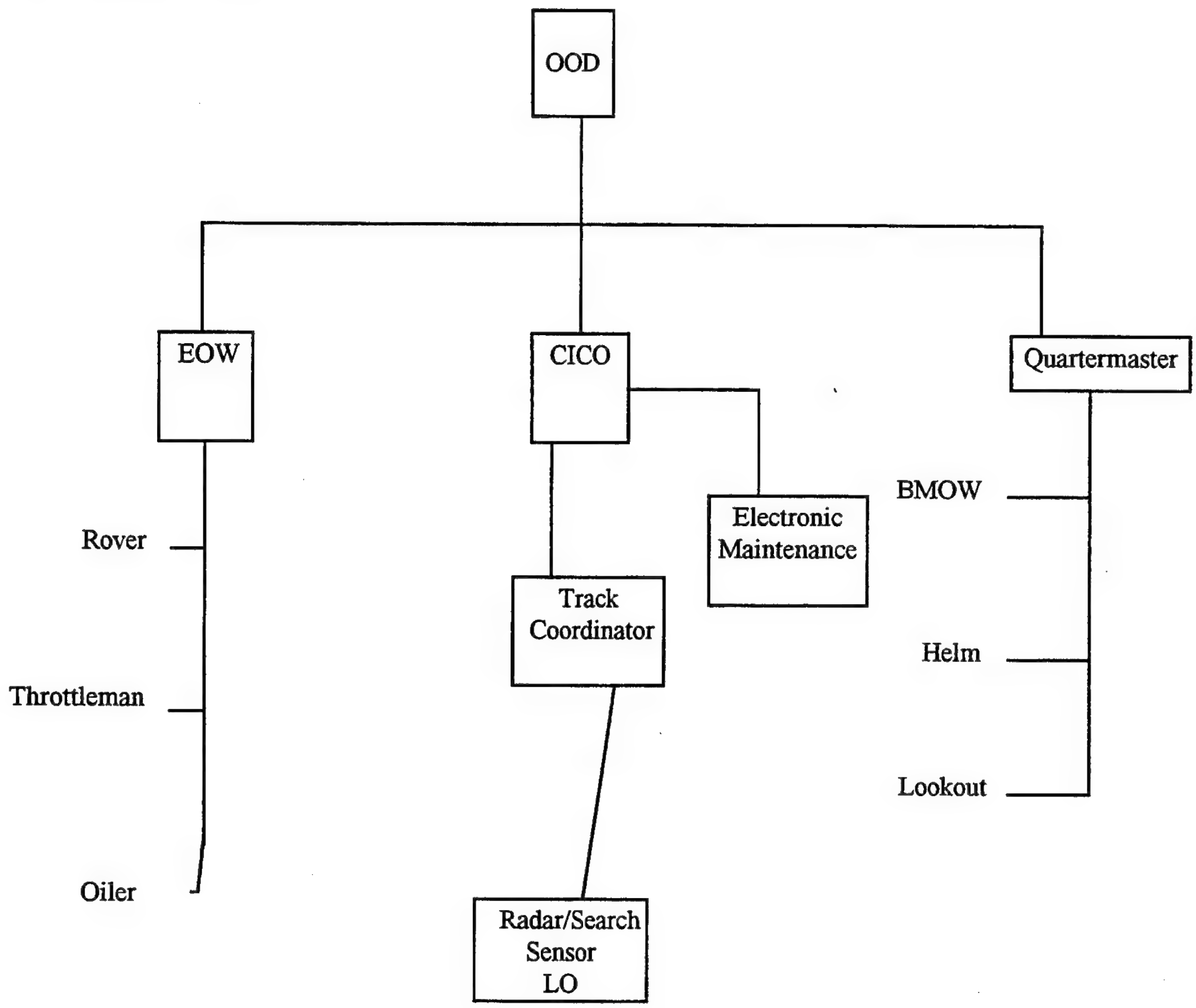
Figure 18 CONDITION I BATTLE ORGANIZATION - COAST GUARD



LEGEND

CICO	COMBAT INFORMATION CENTER OFFICER
EOOW	ENGINEERING OFFICER OF THE WATCH
OOD	OFFICER OF THE DECK

Figure 19 CONDITION III BATTLE ORGANIZATION - NAVY



LEGEND

CICO	**COMBAT INFORMATION CENTER OFFICER**
EOOW	**ENGINEER OF THE WATCH**
OOD	**OFFICER OF THE DECK**
BMOW	**BOATSWAIN MATE OF THE WATCH**

Figure 20 CONDITION III BATTLE ORGANIZATION - COAST GUARD

G. CONVERSION

The ORD dictated the requirement of two ship variants form one hull, one operated by the Navy, the other by the Coast Guard. As much as possible the variants were kept the same to reduce costs and to ease production. The variants differ where it was necessary by due to their different missions. The Navy variant requires a robust self defense capability, some strike capability, and sophisticated air search capabilities. The Coast Guard variant will be used in drug, smuggling, and illegal immigration interdiction, fisheries protection, SAR, escort, and general maritime police duties. In addition, different maximum costs were set for each variant, the Coast Guard variant's being $375 million and the Navy variant's being $450 million. Conversion must take place in under four weeks. Because of these mission differences, the following conversions are required for the Navy variant to become the Coast Guard variant and vice versa.

1. Remove: VLS Install: fuel storage, buoy storage area with sinkers and chain and environmental clean- up gear.

The VLS will be constructed as one unit that can be removed all at once. All missiles will be removed from the ship and then the VLS unit will be lifted out and removed. Associated fire control illuminators will be removed from topside. In its place will be fuel storage tank twelve feet from the keel. A buoy storage room will be on top of the fuel tank. An overboard drainage system will be installed. Flush with the main deck will be a watertight 12'X 12' hatch.

2. Remove: 5" gun Install: buoy crane

Ammunition will be removed from the gun magazine. The ammunition elevator will be removed. A watertight door will be installed at the frame 66' aft of the forward perpendicular. An environmental containment skirt will be stored in the former magazine

and will be assessable by this door. The gun will be removed on the main deck and in its place a crane to lift buoys and the skirt will be installed.

3. Remove: ATAS Install: 2 RHI small boats

The ATAS will be removed from the "well deck". Associated equipment in the well deck will be removed. CIC will remain unaffected. Two RHI small boats will be placed in the well deck. Rails are already in place.

4. Remove: Torpedo tubes Install: Prisoner containment room

Remove torpedoes. Remove "bolt on" torpedo tubes and electrical cabling. Patch opening for torpedoes. Install one commode, shower for prisoner head. Fresh water piping will be pre-staged. Install four sets of bunks, three high.

V. DESIGN EVALUATION

A. SURVIVABILITY FEATURES:

The CPCX's survivability characteristics received significant emphasis to support its independent operating nature. Signature reduction was accomplished in three areas by incorporating; radar cross section (RCS) reduction features, infrared (IR) reduction features, and acoustic reduction features. In addition, redundant systems and control spaces further enhance survivability.

The hull, superstructure, and mast consist of flat surfaces, angled at 10 degrees with respect to vertical. All topside equipment such as small boats, deck fittings, torpedo tubes, and miscellaneous gear have been located within the superstructure. These measures will significantly eliminate corner reflectors and reduce the RCS of the CPCX. Further enhancements include the glass reinforced plastic mast and Radar Absorbing Material (RAM) applied to all superstructure and mast surfaces to reduce the reflection of electromagnetic energy.

Infrared cross section reduction methods consist of IR insulation, regenerative gas turbine engines and stack eductors to reduce prime move exhaust temperature.

Acoustic reduction methods include; double sound isolators on the diesel prime movers, acoustic modules on the gas turbine engines, prairie and masker air systems to mask hull noise, and active ship silencing.

The propulsion system was divided among two main engineering spaces located on the 3rd deck. Each engine room contains one diesel and one gas turbine engine to provide main propulsion and electrical power through an electric drive configuration. This propulsion system combined with the DC zonal electrical distribution effectively eliminated all single point failures or "Choke Points" in the engineering system. With a loss of one engine room, the maximum attainable speed is 23kts. In addition, an uninterruptable power supply (UPS) battery is directly connected to the four combat system vital buses. In the event of generator casualties, a seamless transition from primary to alternate power occurs.

Two physically separate CIC's act as a single entity. For the Navy variant, both CIC's are manned during General Quarters. If #1 CIC is lost , the other, although not having as many

consoles, is capable of effectively fighting the ship. For the Coast Guard variant, only one CIC is manned during General Quarters. CIC #2 is capable of fighting the ship if CIC #1 is lost and enough personnel are available to main the alternate space.

Finally, the CPCX's information is distributed through several fiber optic paths in a ring information network. This fiber optic ring allows processing capability to be spread throughout the ship while maintaining a rapid flow of information to all users.

The only single point of failure is the mast which contains the XPAR, surface search radar, forward missile illuminator, IR detectors, and CEC antenna. A casualty to the mast would eliminate navigation and combat systems capability entirely.

B. FURTHER STUDY

This design is the result of one iteration of the design spiral. Areas that require further attention in subsequent iterations include; the single mast, Coast Guard cost, weight management, cost analysis, and a comparison of CPCX with similar ships.

The air search and surface search radars, as well as other vital equipment, are located on a single mast. Placing a second mast on the ship should be investigated. Alternate locations for topside and other systems would also need to be analyzed.

The Coast Guard is buying high cost sensors for ease of convertibility. Modularized detection elements would eliminate this problem. With the indications provided by future technological areas, this concept is possible.

The CPCX is at the upper limits of its service life weight margin. Critical analysis needs to be completed in this area by compiling more accurate weights and by reevaluating system placement.

Cost data was obtained from the ASSET model. This Cost was calculated using weight based empirical formulas. Future study would require accurate costs provided by manufactures, particularly for new technology systems.

Finally, an effectiveness analysis should be conducted on the CPCX and then compared to other ships with similar size, mission, and payload. This analysis would clearly show which ship is "better".

C. DESIGN AS A LEARNING TOOL

The value of this design process as a learning tool was in the use of systems engineering principles to design one of the ultimate engineering systems - a multi-mission capable ship. The learning and adoption of a systems engineering approach can be divided into two broad areas. The first area includes the technical or “textbook” aspects of implementing a structured design process that leads to a finished product, in this case a ship design completed through the preliminary design phase. The second area relates to the teamwork or “human” aspects of working on a relatively long term, large scale project as a member of an eight person team. Each of these areas had its related challenges and demands.

The process of transforming operational requirements into a preliminary design demonstrated the multitude of trade-off, optimizations, analysis methods, and engineering judgments that are required for a large system design. The design process using a system engineering approach shed new light on just how integrated ship systems need to be if they are to operate at an optimal level. Progressing from the definition of a need for a new system through to the preliminary design phase with high level of concern for how the various subsystems will integrate to form a whole system is a concept applicable to not just ships or military craft, but any system having two or more components.

The importance of the teamwork aspect to the design process was manifested early. The realization came that in order for any of our ship systems to be integrated, our efforts as a team had to be integrated as well. Everything from previous experience tours to individual schedules and work habits came into play in completing each aspect of the design. The personal experiences, strengths, and interests of each team member had to be considered so that contributions by each team member could be optimized and the common goal of a successful preliminary ship design could be achieved.

D. CONCLUSION

The CPCX is a multi-mission capable ship that satisfies Navy and Coast Guard needs for a replacement vessel in the year 2010. It is suited for use in littoral as well as blue waters. The

incorporated concept of convertibility allows for a rapid response to ever changing threat environments.

The CPCX meets all requirements as dictated by the ORD. In a successful adherence to our design philosophy, we were able to meet or better the constraints of maximum cost, minimum range, and maximum displacement. In addition, the RCS features previously discussed contribute to the ship's high survivability. The maximum mission effectiveness was achieved by choosing the ship option with the highest measure of effectiveness. A significant reduction in manning was achieved by reviewing current crew positions as well as by incorporating features that implement automation into the design. Our logistics plan along with a menu-driven maintenance system provide the ship with little required maintenance other than basic preventive and essential corrective maintenance. Finally, the quality of life aspect of the crew was important for a minimally manned crew. To improve habitability, crew service spaces were concentrated around the messdecks, the per person space allotment was increased, and recreation spaces were included.

With the items in further study addressed, the design should provide Navy and Coast Guard policy makers a low cost, easily maintainable, minimum manned ship in 2010.

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APPENDIX A

THREAT SCENARIOS

SUMMARY

The initial step in the Combat System selection process is to estimate the future threat scenarios so the CPCX can be designed with a Combat System suite capable of defeating this threat. Threat scenarios were developed to estimate the expected threat the CPCX will encounter beyond an IOC of 2010.

The future threats located on page (A-3) were provided by the faculty advisors. From these future threats, the design teams identified the projected threat environments and selected the possible threats that may be encountered in each environment. The threats were then broken down by specific service. The Navy threat scenarios are located on page (E-4) and the Coast Guard threat scenarios are located on page (E-6). The following letter scale was used to evaluate each specific threat based on the probability of encountering and the capability of that specific threat.

AA - High probability of encountering/High capability threat
AB - High probability of encountering/Low capability threat
BA - Medium probability of encountering/High capability threat
BB - Medium probability of encountering/Low capability threat
CA - Low probability of encountering/High capability threat
CB - Low probability of encountering/Low capability threat
DA - Very Low probability of encountering/High capability threat
DB - Very Low probability of encountering/Low capability threat

Future Threats

Missiles:
A= anti-ship missile, M= other missile

Designation	Cruise (Mach)	Altitude(ft)	Range (nm)	RCS (dB)	Notes
A-1	4.0	150,000	200	-40	RF(active & passive)/IR/video seeker 60 deg dive angle
A-2	2.0	50	100	-40	10g termnvr/IR/video seeker terminal alt. 7 ft
A-3	0.9	20	75	-30	Multiple termnvr/RF/IR seeker A/J
A-4	0.9	10	60	-20	RF seeker A/J
M-1	2.5	LOS	2.5	-45	IR shoulder or multi launcher
M-2	3.5	Various	100	-40	air launched ARM

	Populations: (% of total missile populations)	Distribution: (who owns, # of nations, assuming 250 littoral nations)
A-1	5	10
A-2	20	50
A-3	50	187
A-4	25	50

Guns:
Small arms through 127mm, guided (IR/Laser/RF) and ballistic, ETC and standard propellant.

Mines:
Bottom. moored, floating. All influences

Torpedoes:
Surface and sub launched. Speeds to 80 kts. Contact/magnetic/acoustic triggers.

Misc.:
Mortars, grenades, etc., Chemical and biological agents dispersed through various vectors/methods.

Note:
All ASCMs may be launched from air, surface, or subsurface platforms. Any torpedo may be launched from any submarine.

Navy Threat Scenarios

1. Independent Operations:

- Constitutes the high end of low intensity conflict.
- Conduct law enforcement, board and search, drug operations, blockade, Freedom of Navigation (FON), show the flag, Special Operations Force (SOF), intelligence operations, etc. Primarily littoral environments.
- Operate at long distances from the battle group which can also be considered independent operations.
- Reduced signatures are needed for inherent self-defense capability.
- Threat of three missiles in one minute (AA)
- ASCM threats will originate from small fishing vessels and small hostile combatants A-1 (CB), A-2 (CA), A-3 (BA), A-4 (BA)
- Other missiles: M-1 (BB), M-2 (BA)
- Guns (AB)
- Mines (BA), the CPCX may be conducting mine hunting ops.
- Diesel/electric submarines (BA)
- Will likely see a single threat in a single medium (ie. one airplane, one submarine, one missile) vice several threats from various areas.
- CPCX will spend a significant portion of its time at sea conducting independent operations.
- Must have adequate ship self-defense to protect itself.

2. Group operations without AEGIS support:

- Part of ARG or SAG (non-Aegis)
- Significant contribution to the fleet will include ASW capability, early warning air detection, and mine hunting.
- CPCX in this scenario will be conducting ASW, escort ops, and/or mine hunting
- These scenarios tend to be more blue water oriented. (No matter how "littoral capable" we design the CPCX it will still be expected to operate in blue water with the fleet.)
- CPCX will operate along threat axis (50-150 mi.) ahead of group.
- The CPCX will not have the support of Aegis cruiser/destroyer.
- Air defense (if required) will be provided by missile shooters (NTU CGN, DD with VLS, FFG)
- Mines (CA) less likely in this scenario. (blue water nature)
- The probability of seeing missile A-1 (DA)
- ASCM threat: A-2 (AA), A-3 (AA), A-4 (AA)
- Other missile threat: M-1 (DB), M-2 (AA)
- Missile M-1 is very short range and difficult to counter.
- Missile threat includes three incoming missiles in one minute.
- Diesel/electric submarines (AA)
- Guns (AB)
- This scenario will be the most demanding scenario for the CPCX. Other ships will be present, but CPCX will not have the Aegis umbrella for protection.

3. Group operations with AEGIS support:

- This scenario will be similar to above but the CPCX will have the assistance of an AEGIS cruiser/destroyer. Part of CVBG or SAG.
- Aegis will provide long range air search and air defense.
- CPCX will operate along threat axis (50-150 mi.) ahead of Aegis for ASW capability and early warning air detection an tracking. Can provide Aegis with "heads up" to possible incoming air attack.
- Missile threat is high, but the missile most difficult to counter A-1 (CA) will most likely be targeted for other platforms such as Aegis/CV/LHD, not CPCX.
- Missile threat: A-2 (AA), A-3 (AA), A-4 (AA), M-1 (DB) and M-2 (AA)
- missile M-1 and M-2 are very short range and difficult to counter
- Missile threat includes three incoming missiles in one minute.
- Diesel/electric submarines (AA)
- Guns (BB)

Coast Guard Threat Scenarios

1. Independent Operations: Routine ELT Patrol:

- Fisheries : belligerent fisherman using primitive small arms, large fishing vessels attempting to ram. Threats: M-1 (CB), small arms (BC).
- AMIO: large numbers of migrants, non-threatening unless actually aboard own vessel. Riot risk, possible takeover attempts (internal security issue). Threats: small arms (BC).
- Drug Interdiction/Smuggling/Piracy (AA): high speed surface and aircraft, equipped with high tech small arms, OTS (over the shoulder) missiles, rocket propelled grenades. Threat: A-4 (DA),M-1 (CB)
- Territorial/Sovereignty issues: Foreign governments desiring to make a "statement" concerning Freedom of Navigation issues, international waters fishing treaties (i.e. Recent Canada/Spain fishing rights dispute). May involve use of covert special forces aboard commercial vessels, using a few, but very potent high tech weapons. May also involve shore based threats (aircraft, missiles, gunboats, etc.) if operating near or in foreign littorals (but in international waters). Threat: A-3 (DA), A-4 (CA), M-1 (CB), M-2 (DB).
- Underwater Terrorism: In US port or foreign port, factions placing mines on ship. Terrorist swimmers harassing ship, trying to come aboard, trying to sabotage. Threat: mines (DA).

2. Low Intensity/Group Operations

- Support of limited invasion operations of Third World nations. In concert with other Navy/Coast Guard forces, generally in own hemisphere, i.e. Haiti, Grenada, Panama. May be first US asset on scene. Threats include aircraft and/or small warships (corvette size or smaller). Very limited high tech threats, but abundant weapons of 1990's technology. Threats: A-3 (CA), A-4 (CA), M-1 (BB), M-2 (CB).
- Foreign littorals: UN/US Economic sanctions, embargoes. Commercial ships that are intercepted may contain OTS missiles, small arms. Ramming also a possibility. Threats: M-1 (CB).
- Escort duties for allied shipping in US and foreign littorals. Threats include small surface/sub-surface craft, aircraft and mines. Threats: A-3 (CA), A-4 (BA), M-1 (AB), M-2 (CA). Harbor control duties in foreign ports in support of inland operations. Small surface/sub-surface craft, and mines are potential threats. Threats: A-4 (CA), M-1 (BB), M-2 (CB), and mines (BA)

3. Battlegroup Operations:

- Against First World high tech threats. Involvement limited to configuration capabilities. A-1 (CA), A-2 (CA), A-3 (CA), A-4 (BA), M-2 (CB), torpedoes (BB), mines (AA), misc. (BB)

APPENDIX B

COMBAT SYSTEM REQUIREMENTS

Summary

This Appendix (B) contains the Combat Systems requirements broken down by common requirements for both variants, Navy specific requirements, and Coast Guard specific requirements.

COMBAT SYSTEMS REQUIREMENTS

Category A - Both Variant Specific Requirements

1. Fully inter-operable with other Naval expeditionary, interagency, joint and allied forces.
2. Broad band sensor suite (open ocean and close to land) with minimal detection degradation.
3. Communications suite must have an integrated database capable of interfacing in a Joint Task Force/Combined Task Force (JTF/CTF) environment to include compatibility with joint systems such as the Global Command and Control System (GCCS) and the Joint Worldwide Intelligence Communications System (JWICS). The ship must have a full suite of radios and antennas to support full connectivity via EHF/SHF/UHF/SATCOM.
4. Stop, board and disable other vessels.
5. Embark and support armed rotary-wing aircraft, and conduct rotary-wing aircraft operations.
6. Small boats , minimum capacity of 8 people, up to sea state 4.
7. Humanitarian assistance in the form of at sea rescues, emergency medical care, sustenance and protection.
8. Coastal intelligence gathering.
9. Conduct and support special operation forces worldwide.
10. Support the equipment and personnel of a mine disposal system.
11. Have a reduced electronic, magnetic, thermal, and acoustic signature.
12. Modularized mission specific items for future updates will be used and will lend toward quick conversion between variants.
13. Minimization of crew size while maintaining capability is essential.

Category B - Navy Specific

1. Destroy or neutralize enemy targets afloat and ashore through the use of coordinated, precision strike weapons.
2. Provide firepower support for amphibious and other ground forces.

3. Detect, identify, and engage air, surface, and underwater threats.
4. Perform ship self defense against foreign military enemies and civilian terrorists at sea and in port.
5. Defend itself against raids comprised of 3 ASCMs arriving within a one minute.
6. Conduct engagements cooperatively with other ships, submarines, aircraft, space systems, and land systems.
7. Detect and chart underwater mines.

Category C - Coast Guard Specific

1. Detect, identify, and engage air and surface threats.
2. Perform ship self defense against foreign military enemies and civilian terrorists at sea and in port.
3. Conduct engagements cooperatively with other ships, military and civilian aircraft, and land systems.
4. Detect and chart underwater mines.
5. System for prisoner containment.
6. Transport and station small navigational buoys.
7. Assist in the containment of oil spills.
8. Be capable of joining the Naval fleet in joint operations and in time of war.

APPENDIX C

COMBAT SYSTEMS ELEMENTS CONSIDERED

SUMMARY

A summary of Combat System elements considered for the CPCX design is contained in the following appendix. The design teams researched guns, ASW sonars, air /surface search sensors, missiles, mine hunting devices, and small boats from various countries. This provided a database of current weapon systems and their capabilities from which the design teams could pick the elements needed to satisfy given requirements and meet projected threats.

GUNS

LARGE

Name	Weight	Rate	Ranges (surface/AA)	Source
5"-54 MK 45	24.27 t	16-20 rds/min	12.4 nm / 15 km	US
Oto Melara 127 (Alleggeritto)	20.5 t	45 rds/min	8.6 nm / 13.6 km	Italy
Vickers 4.5"	23.25 t	25 rds/min	11.9 nm	UK
Bofors TAK 120	28.8 t	80 rds/min	10 nm	Sweden

MEDIUM

Name	Weight	Rate	Ranges (surface/AA)	Source
Greusat-Loire 100	13.5 t	10,40, 90 rds/min	9.15 nm / 6 km	France
Oto Melara 76	7.5 t	80 rds/min	16 km	Italy
Bofors TAK 76	6.5 t	30 rds/min	6.8 nm	Sweden
Bofors 40	5.6 t	600 rds/min	6 km / .4 km	Sweden
Breda Fast 40	6 t	900 rds/min	6.75 nm / 8.7 km	Italy
Trinity 40	4000 kg	330 rds/min	1.61 nm / 6 km	Sweden

SMALL

Name	Weight	Rate	Ranges (surface/AA)	Source
Mk 88 Bushmaster 25	589 kg	180 rds/min	1.33 nm	US
Giat 20	222 kg	650 rds/min	1 nm	France
Oerlikon 20	500 kg	800 rds/min	1 nm	Int'l

ANTI-SHIP MISSILE DEFENSE

Name	Weight	Rate	Range	Source
Midas 27	4.6 t	7200 rds/min		Germany
Myriad 25	7700 kg	10,000 rds/min	1.07 nm	Italy
Sea Zenith 25	5450 kg	3400 rds/min	1.07 nm	Switz
Goalkeeper 30	6800 kg	4200 rds/min	1.61 nm	Neth
CIWS 20	6.18 t	4500 rds/min	.75 nm	US

NEW TECHNOLOGIES

ETC: Liquid propellant, Large mounts only
Rocket Assisted Projectiles
Guided Munitions: Command Guidance, IR seeker, laser designator, Semi-active

ASW SONARS

HULL MOUNTED

Name	Frequency	Weight	Source
AN-SQS 505	5.4 KHz		Canada
Type 5051 (505 improved)	5.4 or 7 KHz		Canada
Diodon	12 KHz	1500 kg	France
PHS-32	3 freqs	2500-8000 kg	Neth
Sea Hunter	10.5 KHz		UK
Sea Searcher	6 to 9 KHz		UK
AN-SQS 56	5.4 KHz		US
AN-SQS 53	3.5 KHz	60000 lb dome	US

TOWED ARRAY OR VDS

Name	Frequency	Weight	Source
SONAC PTA			Fin
Diodon	12 KHz	8 tonnes	France
Salmon	19 KHz	7630 kg	France
ATAS		4.7 tonnes (mod)	UK
COMTASS			UK
AN-SQS 35	13 KHz		US
AN-SQR 19			US

DIPPING SONARS

AN-AQS 13	9.25-10.75 KHz	775 lb	US
AN-AQS 18	9.25-10.75 KHz	600 lb	US
ALFS			

NEW DEVELOPMENTS

Twin Tails
Bi-static towed arrays
Combined fish and array

Radar Characteristics

COUNTRY	DESIG.	Peak Pwr (KW)	Avg. Pwr. (KW)	Freq	Pulse length (microsec)	Gain (dB)	BW horiz (deg)	BW vert (deg)
Israel	EL/M-2207	425	425	3.1-3.3 GHz	0.4-1.4	28	3.3	10
US	SPS-49	360	13	850-942 MHz	125	29	3.3	9
US	SPS-65/ER	25	1.2	1.2-1.35 GHz	7	23	3	
US	FAST	1000	10	5.4-5.9 GHz	0.6-200	-	3	9
France	CASTOR II	30	0.12	6.2-10.4 GHz	7.5	43	0.67	1.5
Netherland	SMART	150	-		0.6	31.5	2	7
-	XPAR	5000	58	10 GHz	5.5	40	1.5	1.5
US	SPY-1D	5000	58	3.1-3.5 GHz	var	42	1.7	1.7

ANTI-SURFACE MISSLES

NAME	DESIGNATOR	COUNTRY of Origin	LAUNCH Vehicle	WEIGHT (lbs)	RANGE (Km)	SPEED (Mach)	CRUISE ALT (feet)	ATTACK ALT (feet)	WARHEAD WGT (lbs)	WARHEAD TYPE	GUIDANCE	DIAMETER (ft)	LENGTH (ft)	COST (Dollars)	COMMENTS
Silkworm		China	ship/shore	2998	95	0.9		30-50	513	blast	MPR,IR,	0.76	7.36		
Flying Dragon	FL-1/SY-1		ship/shore					30	513		MPR				
Sea Eagle															
	FL-2		ship/shore	1300	50	0.9		skimmer	365	SC	"Anti-Jam"	0.54	6		
	FL-7		ship/shore	1800	32	1.4	50-100			SC	ECCM features	0.54	6.6		
	C801/802		ship/air	815	80-50	0.9	20-30	5-7	165	SAP	MPR	0.36	5.8		
Exocet		France	ship/air/sub	750	42-65	0.93	9	2.5-8	165	Blast/frag	see note 1	0.348	5.2	$400,000	
ANS			ship/air	850	180	2	high alt	skim/weave	180	SAP		0.35	5.7	$1,500,000	
	SS 11		ship/air/	66	3.3	580 fps	LOS	LOS	16	3.5 # HE blast	Wire Guided	6.4 in	47.6 in	$1,900	obsolete
	SS12M		ship/air/shore	165	6.5	580 fps	LOS	LOS	62.5 #	SAP,several	WG	7.1 in	73.7 in		
Gabriel	II	Israel	ship/air/shore	500	40	0.65		2.5	180		optical/CG	0.35	3.35	$400,000	
	III			560	36	0.65		1.5	150		FAAS	0.34	3.85	$450,000	
	IV			960	200	0.85			200			0.43	4.7	$675,000	
Otomat	I	Italy	ship/	770	60	0.9	80	175 pop	210	blast	Xbnd AS			$400,000	83 known launch platforms
	II				180	0.9		skim			CG helo/				
Otomach					193-380	2			100		AS/IR/TV				
Sea Killer				330	25	1.9	5	3.4	70	HE frag	beam rider	0.32	4.84		
Sea Power	SSM-1	Japan	ship/air	661	150	0.9			225			0.35	5	$680,000	Harpoon Copy Cat
Penguin	AGM-119	Norway	Ship/shore	330	40	0.8	100	skim	250 #	SAP	IR	0.28	2.95	$220,000-$550,000	
	Rb 08A	Sweden	ship/shore	782	75	0.65			250	blast frag		0.65	5.7		
Penguin II	Rb 12														
	RBS 15		ship/air	598	70	0.7			250	SAP	X,Ku	0.5	4.35	$479,000	
Styx	SS-N-2	Russia	Ship/Shore	2300	25	0.9	400	100	500		I band active	0.76	6.5		
Sandbox	SS-N-12		ship/	5000	300nm	2.5			1000	HE		0.9	11.7		
Sunburn	SS-N-22		ship/		68nm	2.5			454	HE			9.15		
Hellfire	AGM-114A	USA	ship/air/shore	50	3nm	1 +			9.1	SC	SAL	18	1.63		
Tomahawk	TLAM/TASM		Ship/air/sub	2640	250-700	0.75	15-100m	30m	454 kg	various	Inertial/Tercom	1.8	18.06	$1,800,000	
Harpoon	AGM-84		ship/air	520	80nm	0.85			225	var	var	34.3	4.63	$300,000	40% of production for foreign sales

Notes	
MPR	Mono Pulse Radar
CCP	Course Correcting Projectile
SAP	Semi Armor Piercing
FAAS	Frequency Agile Active Seeker
AP	Armor Piercing
SC	shaped Charge
SAL	Semi-Active Lasar

ANTI-AIR MISSLES

NAME	COUNTRY of Origin	LAUNCHER	WEIGHT (lbs)	RANGE (Km)	SPEED (Mach)	GUIDANCE	DIAMETER (ft)	LENGTH (ft)	Comments
MASCURA	France	twin	4600	30	3	Semi-Active	1.3	28.2	Need 3D radar reloading semi-auto
MISTRAL		launch tube	44	3.7	2.6	Active	0.3	5.9	
CROTALE		VLS R&D	231	8	2.5	Semi-Active IR TV	0.5	9.8	designed to counter air saturation attacks
RAM	USA	bolt on several	1621	5.6	1.0+	Passive RF/IR	0.42	9.2	
STINGER		Shoulder	22.3	3	2.2	Optical IR Homing Passive IR/UV	0.23	5	
SM-2 ER		VLS/Rail	2898	30+	2.5	Semi-Active	1.13	26.2	
SM-2 MR		VLS/Rail	1388	10+	2.5	Semi-Active	1.13	14.7	
SEA SPARROW		VLS R&D/Box	500	12	1	Semi-Active CW RF	0.67	12	
SEA DART	Great Britain	cannister	1210	50	3	Semi-Active	1.4	14.5	
SEA WOLF		vertical	1761	4	2	Semi-Active	0.6	6.5	launch and control automatic
ASPIDE	Italy	box	485	11	2.5	Semi-Active	0.7	12.1	good in ECM and clutter
GRAIL	Russia	shoulder	201	6	1.5	Active IR	0.2	4.8	

ANTI-SUB MISSLES

NAME	COUNTRY of Origin	LAUNCHER	WEIGHT (lbs)	RANGE (Km)	SPEED (Mach)	GUIDANCE	DIAMETER (ft)	LENGTH (ft)	Comments
ASROC	USA	MK16,26,10,VL	957	7		Active	1.1	15.1	Anti-Sub
IKARA	Austrailia	Rail/tubes	1400	13	0.8	Active	1	11.2	Anti-Sub

Mine Hunting Devices

Hull Mounted	Manufacturer	Frequencies	Weight	Power Required	Max/Min Depths	Beamwidths	Cost	Notes/Comments
SH100	Simrad	95/335kHz			up to 100 m	Search: 45° hor, 1.6° ver Classification: 16° hor, .25° ver		Retractable, detects 600 m, classify 200 m, can operate search and classification sonars simultaneously, 10° vertical coverage in both modes
Variable Depth/ Towed/Side Scan/ROV								
RMOP-Dolphin	ISE (UK) / NSWC	7.3 m long 1 m diameter	2832 kg	150 shp	semi-submersible			air breathing, diesel powered semi-submersible, connect to ship via LOS UHF data link. 24 hr endurance at 12 kts. Operable in Sea State 5.
SEABAT6012	Reson Systems	455kHz	100 lbs	N/A	N/A	Search: 165° hor, 15° ver Classification: 1.5° hor, 15° ver		Volume search and near surface surveillance sonar mounted on keel of Dolphin. Up to 200 m range. Multiple beams (60), with 20 kHz bandwidth. Operates at speeds up to 12 kts.
AN/AQS-14	Westinghouse							towed array behind RMOP. Used for bottom scanning. 3 m long
SQQ-14/30	Martin Marietta	80/350 kHz			45 m	Search: 100° hor, 10° ver Classification: 18° hor, 10° ver		
PVDS: Sutec Double Eagle/TSM 2022 Mk3	Bofors/ Thomson Sintra	165/400 kHz	480 kg (including payload		300m	Search: 63° hor, 19° ver Classification: 12° hor, 7° ver		5 kts, 600 m umbilical

Type	Length	Beam	Max speed	Cargo/Passengers	Max Weight	Range	Engine	Notes
Surf boat	26 ft	8 ft	16 kts light, 12 loaded	3500 lbs or 16 passengers	5000 lbs light	50 nm @ 10 kts	Diesel	Self righting, self bailing
Fast boat	21-24 ft	8.5 ft	30 kts	1800 lbs or 8 passengers	4000 lbs light	25 nm @ max speed, 50 nm @ 10 kts	Diesel	Self bailing, 12" fender minimum (5 kt bumper), stern launchable

APPENDIX D

SONAR CALCULATIONS

Summary

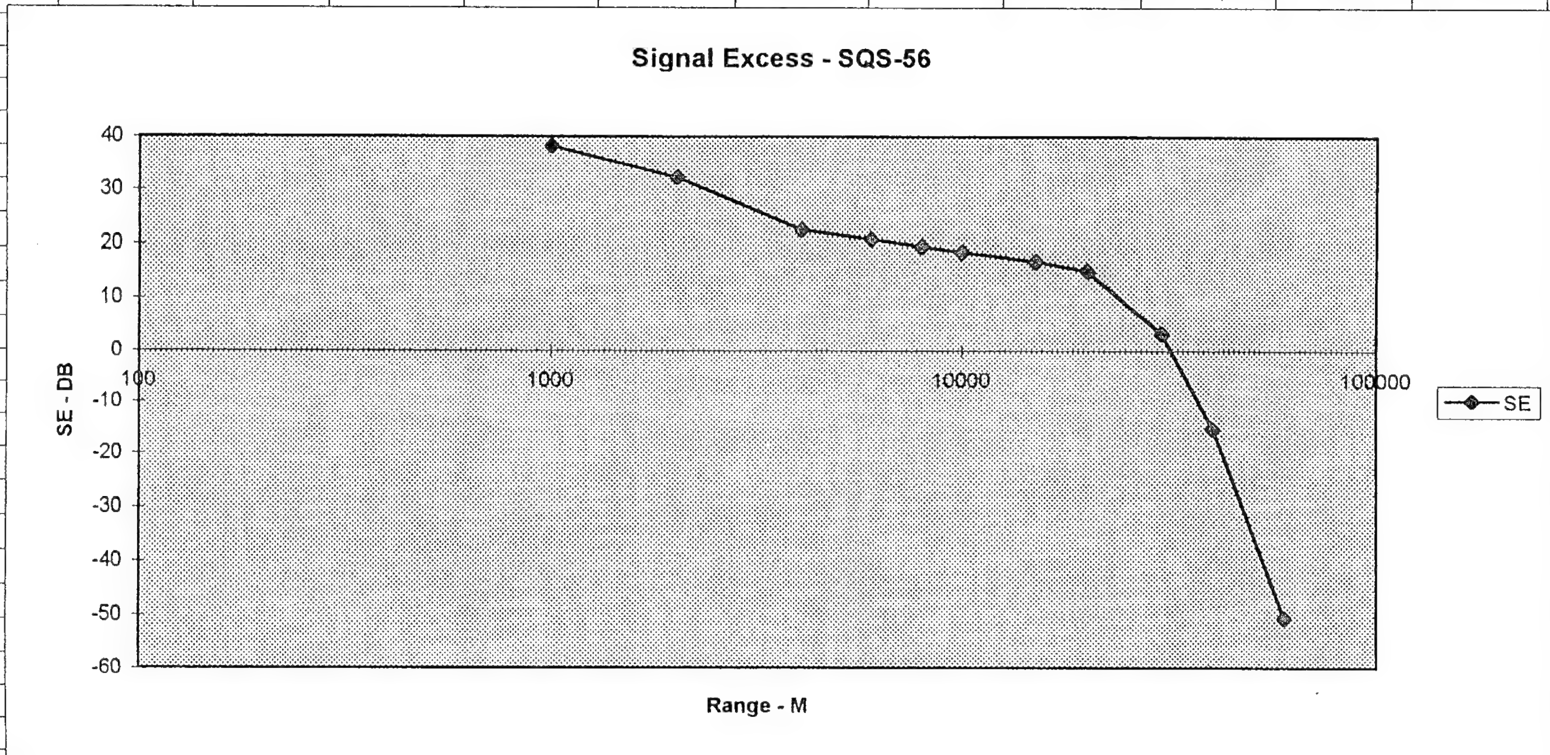
Sonar calculations were completed for two sonar systems, a SQS-56 hull-mounted sonar and a Active Towed Array Sonar (ATAS). Using a Microsoft Excel V5.0 spreadsheet, parameters for frequency, power output, sound speed, depth, and pulse width were used to calculate the detection range for a submarine with a target strength of 15dB, at a depth of 150 meters in water 2000 meters deep. Assumptions included a 50% probability of detection and straight ray path propagation.

Page D-3&4 contains the range calculations for the SQS-56 sonar

Page D-5&6 contains the range calculations for the ATAS

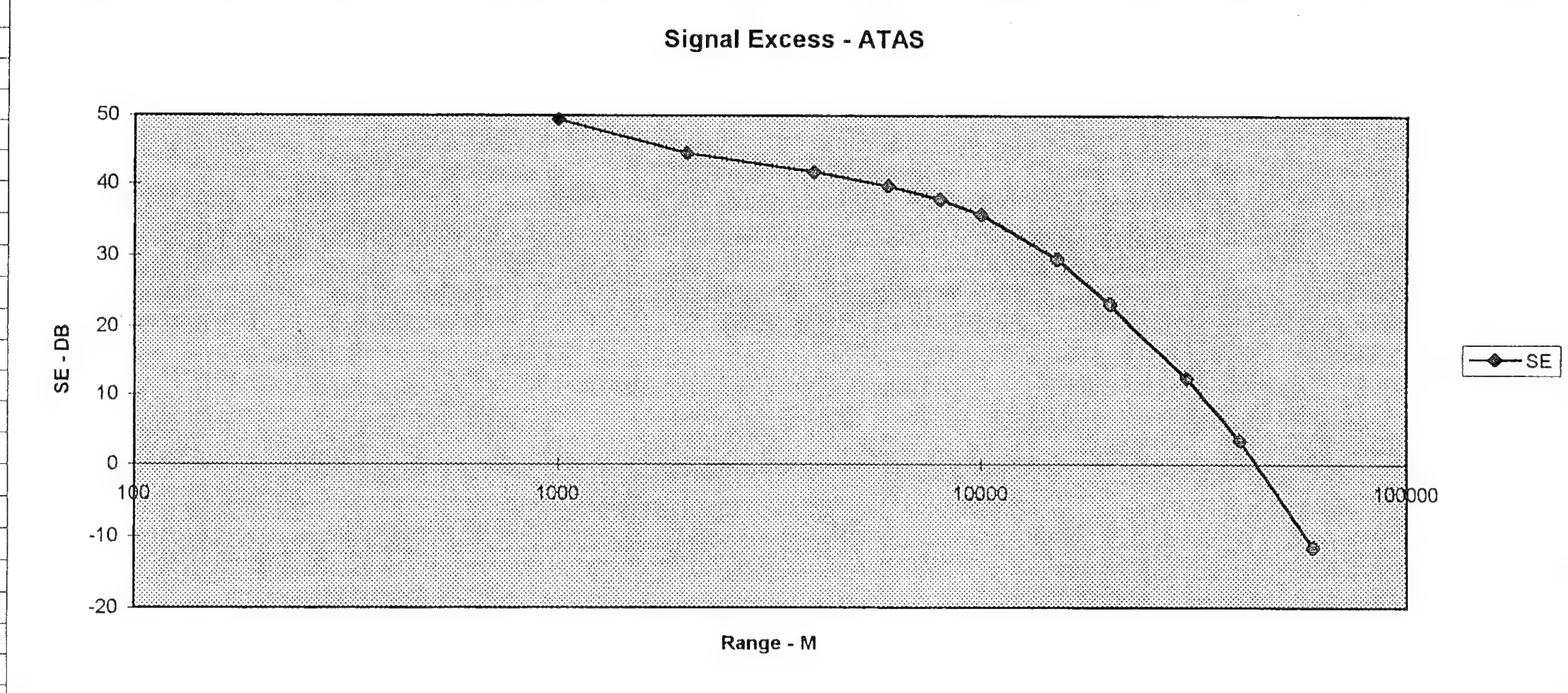
Active sonar range prediction										
SQS-56 sonar										
Constants										
c=	1500		f=	7500		depth=	4		W=	125
diameter=	1.2		h=	1.2		Power=	3600			
DT=	0		alpha=	0.000704		T=	0.1			
Calculated parameters										
BWh=	9.75205		BWv=	8.468383		AG=	26.98954			
SLt=	233.5526		DT=	-2.49877						
Target parameters										
depth=	150		TS=	15		depth b=	2000			
Level Calculations										
Range	Spreading	Atten	2TL	PHIt	2ARt	SLr	Vol	RSv	2EARv	RLv
1000	120	1.408	121.408	8.395191	-1.5	125.6446	86.74975	-73	-22.4279	103.4665
2000	132.0412	2.816	134.8572	4.186316	-0.5	113.1954	92.75301	-73	-22.4517	95.99668
4000	144.0824	5.632	149.7144	2.091761	0	98.83817	95.76331	-73	-15.6634	90.93809
6000	151.1261	8.448	159.5741	1.394335	0	88.97852	97.52422	-73	-15.6634	82.83935
8000	156.1236	11.264	167.3876	1.045706	0	81.16497	98.77361	-73	-15.6634	76.27519
10000	160	14.08	174.08	0.836548	0	74.47257	99.74271	-73	-15.6634	70.55189
15000	167.0437	21.12	188.1637	0.557688	0	60.38892	101.5036	-73	-15.6634	58.22915
20000	172.0412	28.16	200.2012	0.418263	0	48.35137	102.753	-73	-15.6634	47.44099
30000	179.0849	42.24	221.3249	0.278841	0	27.22772	104.5139	-73	-15.6634	28.07825
40000	184.0824	56.32	240.4024	0.20913	0	8.150167	105.7633	-73	-15.6634	10.25009
60000	191.1261	84.48	275.6061	0.13942	0	-27.0535	107.5242	-73	-15.6634	-23.1926

Range	Area	PHIs	2EARs	RSs	RLs	PHIb	2EARb	RSb	RLb	NLr	NL	SE
1000	41.06035	0.229184	-15.6721	-60	77.53285	0				37.97956	103.4775	38.15536
2000	44.07065	0.114592	-15.6721	-60	67.09395	0				37.97956	96.00227	32.18141
4000	47.08095	0.057296	-15.6721	-60	55.24705	60.06614	-45.6721	-18	67.24705	37.97956	90.93928	22.3872
6000	48.84186	0.038197	-15.6721	-60	47.14831	70.56929	-45.6721	-13	64.14831	37.97956	82.84066	20.62617
8000	50.09125	0.028648	-15.6721	-60	40.58415	75.55207	-45.6721	-11	59.58415	37.97956	76.277	19.37628
10000	51.06035	0.022918	-15.6721	-60	34.86085	78.48643	-45.6721	-10	54.86085	37.97956	70.55546	18.40542
15000	52.82126	0.015279	-15.6721	-60	22.53811	82.35316	-45.6721	-9	43.53811	37.97956	58.27112	16.60611
20000	54.07065	0.011459	-15.6721	-60	11.74995	84.27235	-45.6721	-8	33.74995	37.97956	47.90778	14.9319
30000	55.83156	0.007639	-15.6721	-60	-7.61279	86.1851	-45.6721	-8	14.38721	37.97956	38.40266	3.313372
40000	57.08095	0.00573	-15.6721	-60	-25.441	87.13975	-45.6721	-9	-4.44095	37.97956	37.98688	-15.3484
60000	58.84186	0.00382	-15.6721	-60	-58.8837	88.09361	-45.6721	-9	-37.8837	37.97956	37.97956	-50.5447



Active sonar range prediction										
ATAS sonar										
Constants										
c=	1500		f=	3000		depth=	100		W=	125
diameter=	0.3		h=	1.2		Power=	2500		depth b=	2000
DT=	0		alpha=	0.0002		T=	0.1			
Calculated parameters										
BWh=	25		BWv=	21.27368		AGt=	18.9217		BWhr=	1.27
SLt=	223.9011		DT=	-2.49877		AGr=	31.17162		BWvr=	25
	-									
Target parameters										
depth=	150		TS=	15						
Level Calculations										
Range	Spreading	Atten	2TL	PHIt	2ARt	SLr	Vol	RSv	2EARv	RLv
1000	120	0.4	120.4	2.865984	-0.5	118.0011	87.14634	-73	-30.0547	87.59279
2000	132.0412	0.8	132.8412	1.432544	0	106.0599	92.75301	-73	-30.6222	80.19074
4000	144.0824	1.6	145.6824	0.716216	0	93.2187	95.76331	-73	-30.9603	70.0217
6000	151.1261	2.4	153.5261	0.47747	0	85.37505	97.52422	-73	-31.0831	63.81618
8000	156.1236	3.2	159.3236	0.358101	0	79.5775	98.77361	-73	-31.1466	59.20452
10000	160	4	164	0.28648	0	74.9011	99.74271	-73	-31.1854	55.45842
15000	167.0437	6	173.0437	0.190986	0	65.85745	101.5036	-73	-31.238	48.12309
20000	172.0412	8	180.0412	0.14324	0	58.8599	102.753	-73	-31.2647	42.34826
30000	179.0849	12	191.0849	0.095493	0	47.81625	104.5139	-73	-31.2916	33.0386
40000	184.0824	16	200.0824	0.07162	0	38.8187	105.7633	-73	-31.3051	25.27688
60000	191.1261	24	215.1261	0.047746	0	23.77505	107.5242	-73	-31.3188	11.98052

Range	Area	PHIs	2EARs	RSs	RLs	PHIb	2EARb	RSb	RLb	NLr	NL	SE
1000	45.14879	5.73917	-24.525	-50	74.1249	0				54.0474	87.78578	49.38571
2000	48.15909	2.865984	-24.525	-50	64.694	0				54.0474	80.32179	44.4085
4000	51.16939	1.432544	-24.525	-50	54.8631	61.64065	-54.525	-18	56.8631	54.0474	70.25734	41.63176
6000	52.9303	0.954974	-24.525	-50	48.78036	71.53854	-54.525	-13	55.78036	54.0474	64.37314	39.67231
8000	54.17969	0.716216	-24.525	-50	44.2322	76.26096	-54.525	-11	53.2322	54.0474	60.46524	37.78266
10000	55.14879	0.572967	-24.525	-50	40.5249	79.04722	-54.525	-10	50.5249	54.0474	57.90047	35.67102
15000	56.9097	0.381975	-24.525	-50	33.24216	82.72299	-54.525	-9	44.24216	54.0474	55.06457	29.46328
20000	58.15909	0.28648	-24.525	-50	27.494	84.54868	-54.525	-8	39.494	54.0474	54.34056	23.18974
30000	59.92	0.190986	-24.525	-50	18.21126	86.36884	-54.525	-8	30.21126	54.0474	54.08282	12.40383
40000	61.16939	0.14324	-24.525	-50	10.4631	87.27743	-54.525	-9	21.4631	54.0474	54.05335	3.435745
60000	62.9303	0.095493	-24.525	-50	-2.81964	88.18533	-54.525	-9	8.180361	54.0474	54.04768	-11.6022



APPENDIX E

RADAR CALCULATIONS

Summary

Radar calculations were completed on several radars from various countries of origin including: EL/M-2207 (Israel), SPS-49 (US), FAST (US), Castor II (France), SMART (Netherlands), SPY-1D (US), and X-band Phased Array Radar (XPAR). The XPAR is a conceptual radar design utilized by the CPCX design team to achieve high performance radar characteristics combined with the advantage of low weight and reduced volume. XPAR has many of the features and capabilities of a SPY-1D radar, however the XPAR utilizes a X-band operating frequency instead of the SPY's S-band to achieve weight reduction in many system components including: array size, waveguide dimensions and computers.

The calculations utilized each radar's specific characteristics including power output, beamwidth, pulse width, and frequency to calculate the signal excess in terms of range. Each threat missile's radar cross section (RCS) was then used with the signal excess vs range plot to determine the maximum detection range. These calculations were performed for each radar against each missile flying either a beam centered or sea skimming attack trajectory. An example of these calculations for the SPY-1D radar is located in tables (E-1) and (E-2) respectively. A summary of all radars and their maximum detection range for each missile is located in table (E-3).

Table E-1: SPY-1D Radar Calculation, Beam Centerline Target

Constants								
h=	20		c=	3E+08		TS=	0	
d=	3.75		DT=	-1.53		t=	2.17E-03	
Pt=	5.00E+06		Pavg=	3230.77				
Parameters								
T=	1.40E-06		f=	3.30E+09		alpha=	8.00E-06	
BWh=	1.70		Lv=	2.71		Phi(cl)=	10	
Lh=	2.71		BWv=	1.70		AG=	38.54	
rpm(max)	130.77		rpm=	60			Pulses/look=	2.18
Noise Level								
NL(amb)	-148.00		NL(int)	-132.46		NL(tot)=	-132.34	
Source Level								
Slt=	94.52561							
Range	SLt	2*AR	2*TL	TS	SLr	DT	SLr*	
10	94.53	-1	-40.00	0	53.53	-1.53	55.06	
30	94.53	-1	-59.09	0	34.44	-1.53	35.97	
100	94.53	-1	-80.00	0	13.52	-1.53	15.05	
300	94.53	-1	-99.09	0	-5.56	-1.53	-4.03	
1000	94.53	-1	-120.02	0	-26.49	-1.53	-24.96	
3000	94.53	-1	-139.13	0	-45.61	-1.53	-44.08	
10000	94.53	-1	-160.16	0	-66.63	-1.53	-65.10	
22583.18	94.53	-1	-174.51	0	-80.99	-1.53	-79.46	
45166.36	94.53	-1	-180.92	0	-87.39	-1.53	-85.86	
100000	94.53	-1	-186.60	0	-93.07	-1.53	-91.54	
200000	94.53	-1	-201.24	0	-107.72	-1.53	-106.19	
300000	94.53	-1	-211.88	0	-118.36	-1.53	-116.83	
400000	94.53	-1	-220.48	0	-126.96	-1.53	-125.43	
Reverberation Level			rmax=	22583.18				
Range	SLt	2*TL	Area	Phi	RSs	EAR	2*AR	RLs
30	94.53	-59.09	45.98	-90.00	-15	-23.26	-35	8.16
100	94.53	-80.00	51.20	-17.46	-48	-23.26	-8	-13.53
300	94.53	-99.09	55.98	-5.74	-57	-23.26	-4	-32.85
1000	94.53	-120.02	61.20	-1.72	-64	-23.26	-2	-53.54
3000	94.53	-139.13	65.98	-0.57	-77	-23.26	-1	-79.89
10000	94.53	-160.16	71.20	-0.17	-92	-23.26	-1	-110.69
22583.18	94.53	-174.51	74.74	-0.08	-100	-23.26	-1	-129.50

Table E-1: SPY-1D Radar Calculation, Beam Centerline Target

Signal Excess					
Range	RLs	NL(tot)	NL+RLs	SLr*	SE
10	28.00	-132.34	28.00	55.06	27.06
30	8.16	-132.34	8.16	35.97	27.81
100	-13.53	-132.34	-13.53	15.05	28.58
300	-32.85	-132.34	-32.85	-4.03	28.81
1000	-53.54	-132.34	-53.54	-24.96	28.58
3000	-79.89	-132.34	-79.89	-44.08	35.81
10000	-110.69	-132.34	-110.66	-65.10	45.55
22583.18	-129.50	-132.34	-127.68	-79.46	48.23
45166.36		-132.34	-132.34	-85.86	46.48
100000		-132.34	-132.34	-91.54	40.80
200000		-132.34	-132.34	-106.19	26.16
300000		-132.34	-132.34	-116.83	15.51
400000		-132.34	-132.34	-125.43	6.91

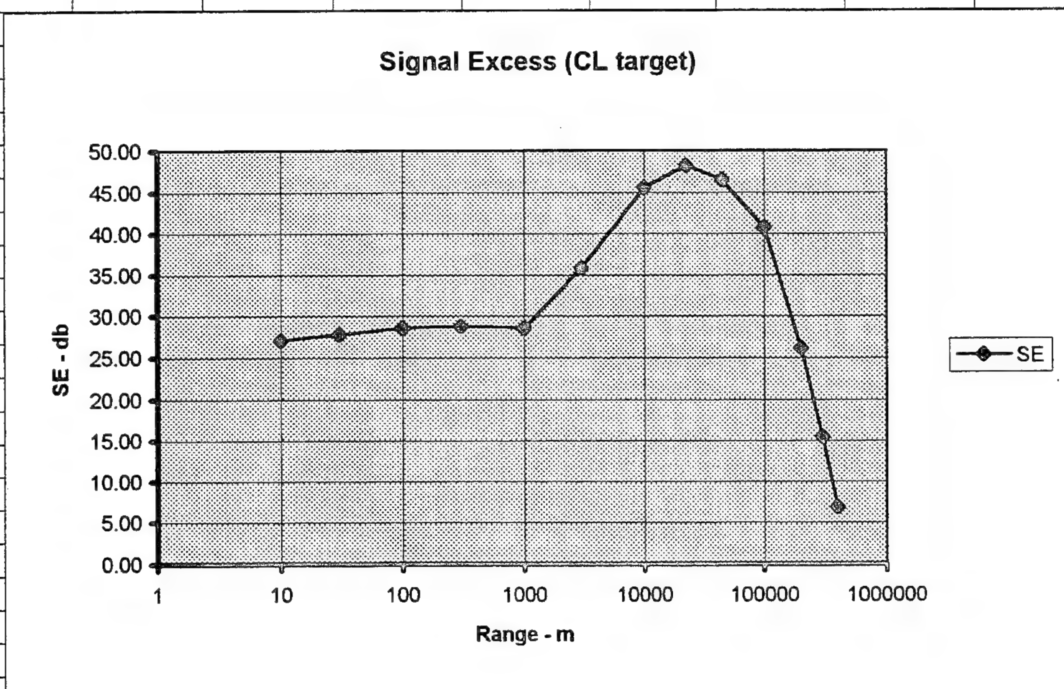
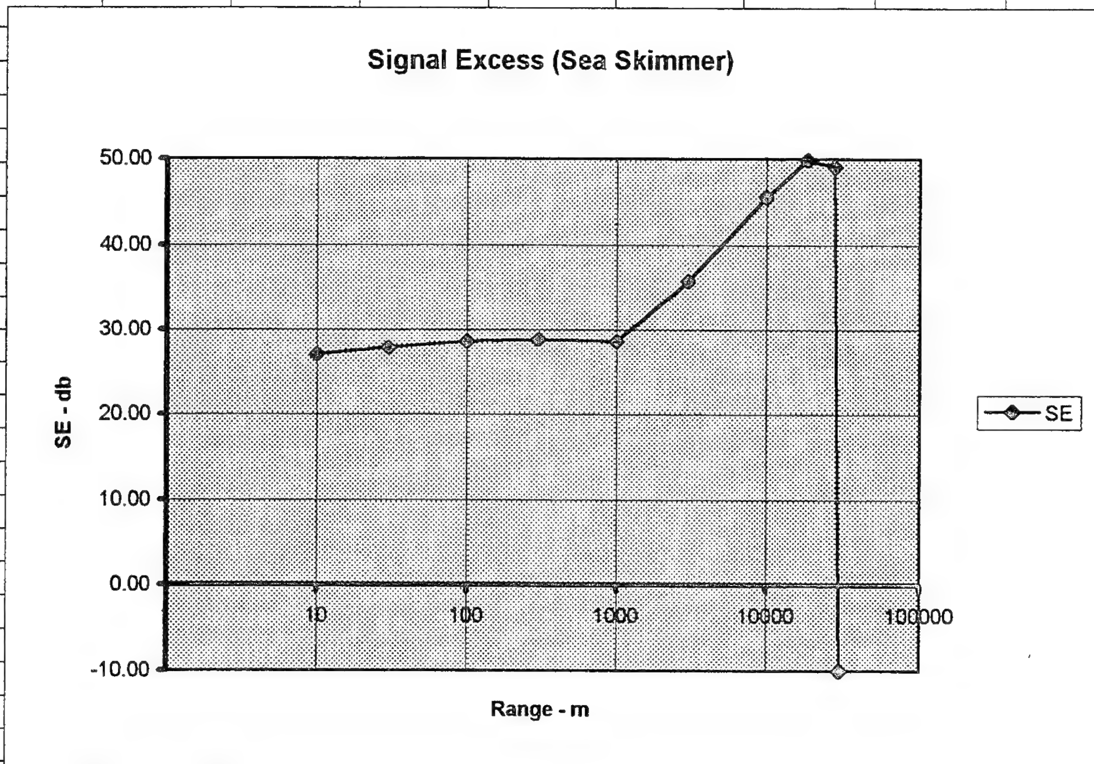


Table E-2: SPY-1D Radar Calculation, Sea Skimming Target

Constants								
h=	20		c=	3E+08		TS=	0	
d=	3.75		DT=	-1.53		t=	2.17E-03	
Pt=	5.00E+06		Pavg=	3230.77				
Parameters								
T=	1.40E-06		f=	3.30E+09		alpha=	8.00E-06	
BWh=	1.7		Lv=	2.71		Phi(cl)=	10	
Lh=	2.71		BWv=	1.70		AG=	38.54	
rpm(max)	130.77		rpm=	60		Pulses/look=		2.18
Noise Level								
NL(amb)	-148.00		NL(int)	-132.46		NL(tot)=	-132.34	
Source Level								
Slt=	94.52561							
Range	SLt	2*AR	2*TL	TS	SLr	DT	SLr*	
10	94.53	-1	-40.00	0	53.53	-1.53	55.06	
30	94.53	-1	-59.09	0	34.44	-1.53	35.97	
100	94.53	-1	-80.00	0	13.52	-1.53	15.05	
300	94.53	-1	-99.09	0	-5.56	-1.53	-4.03	
1000	94.53	-1	-120.02	0	-26.49	-1.53	-24.96	
3000	94.53	-1	-139.13	0	-45.61	-1.53	-44.08	
10000	94.53	-1	-160.16	0	-66.63	-1.53	-65.10	
18439.09	94.53	-1	-170.92	0	-77.40	-1.53	-75.87	
36878.18	94.53	-1	-178.26	0	-84.74	-1.53	-83.21	
Reverberation Level			rmax=	18439.09	tarh=	5	range=	9219.544
Range	SLt	2*TL	Area	Phi	RSs	EAR	2*AR	RLs
30	94.53	-59.09	45.98	-90	-15	-23.26	-35	8.16
100	94.53	-80.00	51.20	-17.4576	-48	-23.26	-8	-13.53
300	94.53	-99.09	55.98	-5.73917	-57	-23.26	-4	-32.85
1000	94.53	-120.02	61.20	-1.71913	-64	-23.26	-2	-53.54
3000	94.53	-139.13	65.98	-0.57297	-77	-23.26	-1	-79.89
10000	94.53	-160.16	71.20	-0.17189	-92	-23.26	-1	-110.69
18439.09	94.53	-170.92	73.86	-0.09322	-100	-23.26	-1	-126.80

Table E-2: SPY-1D Radar Calculation, Sea Skimming Target

Signal Excess						
Range	RLs	NL(tot)	NL+RLs	SLr*	SE	
10	28.00	-132.34	28.00	55.06	27.06	
30	8.16	-132.34	8.16	35.97	27.81	
100	-13.53	-132.34	-13.53	15.05	28.58	
300	-32.85	-132.34	-32.85	-4.03	28.81	
1000	-53.54	-132.34	-53.54	-24.96	28.58	
3000	-79.89	-132.34	-79.89	-44.08	35.81	
10000	-110.69	-132.34	-110.66	-65.10	45.55	
18439.09	-126.80	-132.34	-125.73	-75.87	49.86	
27658.63		-132.34	-132.34	-83.21	49.14	
30000					-10	(Target not visible)



Radar Summary Chart*

CL is a beam centered target
SS is a sea skimming target

	A-1 (-40)		A-2 (-40)		A-3 (-30)		A-4 (-20)		M-1 (-45)		M-2 (-40)		weight (kg)
	CL	SS**	CL	SS	CL	SS	CL	SS	CL	SS	CL	SS	
EL/M-2207 (Israel)	**20**	-	**20**	**5-15**	**37**	**30**	**65**	**30**	-	-	**20**	**5-15**	**ant=245**
SPS-49 (US)	**60**	-	**60**	-	**107**	**2-30**	**180**	**1-30**	**50**	-	**60**	-	**1425 above deck 6325 below deck**
SPS-65/ER (US)	-	-	-	-	**28**	**5-30**	**50**	**3-30**	-	-	-	-	-
FAST (S band) (US)	**75**	-	**75**	**5-15**	**120**	**1-30**	**200**	**3-30**	**60**	-	**75**	**5-15**	**antenna=3182 total=9227**
Castor II (France)	**30**	-	**30**	**10-30**	**55**	**5-30**	**95**	**3-30**	**23**	**15-30**	**30**	**10-30**	**antenna=620**
SMART (Netherlands)	-	-	-	**4-25**	**25**	**30**	**45**	**30**	-	**7-20**	-	**4-25**	**antenna=1200**
XPAR	**85**	-	**85**	**15-30**	**140**	**4-30**	**230**	**15-30**	**65**	-	**85**	**15-30**	**est. 25000**
SPY-1D (US)	**110**	-	**110**	**3-30**	**180**	**2-30**	**260**	**30**	**80**	**10-30**	**110**	**3-30**	**antenna=7400 36000 below deck**

* All ranges in Km
** Missile A-1 is not sea skimming

Table E-3: Radar Summary

APPENDIX F

FUNCTIONAL ALLOCATION TABLES

SUMMARY

Functional allocation tables were constructed for each whole ship option to ensure all operational requirements were satisfied and all functions within the detect, control, engage sequence were performed by at least one element in the Combat System suite. The Functional Allocation tables depicted in this appendix are listed below:

Elements	AAW						ASW				ASUW						MIW			STW		AMW			ELT							SAR							OTW						
Navy Option 1	Vol Search	ESM	IR	Visual	Organic	Inorganic	Active	Passive	Organic	Inorganic	Surf Search	ESM	IR	Visual	Organic	Inorganic	Ship Board	Organic	Inorganic	Organic	Inorganic	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPY-1D	X										X														X	X						X	X						X	X					
SPS-67	X										X														X	X						X	X						X	X					
TAS	X										X														X	X						X	X						X	X					
SQR-19								X																																					
SQS-56							X	X				X					X																												
SH-100																	X																												
SLQ-32		X										X															X							X							X				
VIDEO/OPTICAL				X										X								X							X							X							X		
ACDS																																													
CEC																																													
JMICS																																													
LAMPS	X	X	X	X	X		X	X	X		X	X	X	X	X			X		X		X	X		X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
SMALL BOATS														X	X			X		X		X	X						X	X						X	X						X	X	
IFF																																													
MK 99																																													
- SPG-62																																													
Mk 34 GFCS																																													
- SPG-60/SPQ-9	X										X														X	X						X	X						X	X					
IR Mk-46			X										X															X							X							X			
SQQ-89																																													
- Mk-309 ASWFC																																													
VOICE COMMS																																													
GPS																																													
TACAN																																													
RING INFORMATION NET.																																													
WCS																																													
ISDS																																													
155 mm GUN																																													
CIWS (2)																																													
Mk 49 (RAM LNCHR)																																													
- RAM																																													
VLS																																													
- HARPOON																																													
- TOMAHAWK																																													
- ESS																																													
- SM-2 MR																																													
- VLA																																													
SVTT																																													
- MK 50																																													
SRBOC																																													
NIXIE																																													
EOD TEAM																		X																											
Oper. Requirements																																													
A1																																													
A2	X	X	X	X	X		X	X	X		X	X	X	X	X										X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
A3																																													
A4											X	X	X	X	X										X	X	X	X	X	X															
A5					X				X						X					X			X							X							X							X	
A6					X				X						X					X			X							X							X							X	
A7																																X	X	X	X	X	X		X	X	X	X	X	X	
A8	X	X	X	X	X		X	X	X		X	X	X	X	X		X								X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
A9																																													
A10																	X	X																											
A11																																													
A12																																													
A13																																													
B1																				X																									
B2																						X	X																						
B3	X	X	X	X	X		X	X	X		X	X	X	X	X																														
B4	X	X	X	X	X		X	X	X		X	X	X	X	X																														
B5	X	X	X	X	X																																								
B6	X	X	X	X	X		X	X	X		X	X	X	X	X																														
B7																	X	X																											

Table F-1: Functional Allocation - Detection (Navy option 1)

Table F-2: Functional Allocation - Control (Navy option 1)

Elements	AAW								ASW								ASUW							
Navy Option 1	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn.	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn.	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn.	Command
SPY-1D																								
SPS-67																								
TAS																								
SQR-19											X	X	X	X										
SQS-56										X	X	X	X	X							X	X		
SH-100										X	X	X	X	X										
SLQ-32		X	X	X			X											X	X	X				
VIDEO/OPTICAL		X	X	X		X												X	X	X		X		
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X
CEC				X	X	X	X	X																
JMICS		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X
LAMPS			X	X	X	X					X	X	X	X					X	X	X	X		
SMALL BOATS																			X	X	X	X		
IFF			X	X		X													X	X		X		
MK 99					X	X	X																	
- SPG-62																								
Mk 34 GFCS		X			X	X	X											X			X	X	X	
- SPG-60/SPQ-9		X		X	X		X											X		X	X		X	
IR Mk-46		X	X	X														X	X	X				
SQQ-89										X		X	X	X	X									
- Mk-309 ASWFC										X		X	X	X	X									
VOICE COMMS	X						X	X	X						X	X	X						X	X
GPS								X								X								X
TACAN								X								X								X
RING INFORMATION NET.		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X
WCS							X	X							X	X							X	X
ISDS						X	X	X																
155 mm GUN																								
CIWS (2)				X	X	X	X	X																
Mk 49 (RAM LNCHR)																								
- RAM																								
VLS																								
- HARPOON																								
- TOMAHAWK																								
- ESS																								
- SM-2 MR																								
- VLA																								
SVTT																								
- MK 50																								
SRBOC																								
NIXIE																								
EOD TEAM																								
Oper. Requirements																								
A1	X	X							X	X							X	X						
A2																								
A3	X								X								X							
A4																	X	X	X	X	X	X	X	X
A5																								
A6																								
A7																								
A8																								
A9																								
A10																								
A11																								
A12																								
A13																								
B1																								
B2																								
B3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B4																								
B5	X	X	X	X	X	X	X	X																
B6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B7																								

Elements	MIW							STW				AMW							
Navy Option 1	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Command	Voice Comms	Display	Identify	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn.	Command
SPY-1D																			
SPS-67																			
TAS																			
SQR-19																			
SQS-56																			
SH-100		X	X	X	X	X													
SLQ-32									X	X			X	X	X				
VIDEO/OPTICAL									X	X			X	X	X		X		
ACDS		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X
CEC																			
JMICS		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X
LAMPS			X	X	X	X								X	X	X	X		
SMALL BOATS			X	X	X	X								X	X	X	X		
IFF																			
MK 99																			
- SPG-62																			
Mk 34 GFCS													X			X	X	X	
- SPG-60/SPQ-9													X		X	X		X	
IR Mk-46													X	X	X				
SQQ-89																			
- Mk-309 ASWFC																			
VOICE COMMS	X							X			X	X						X	X
GPS											X								
TACAN							X												X
RING INFORMATION NET.		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X
WCS							X											X	X
ISDS																			
155 mm GUN																			
CIWS (2)																			
Mk 49 (RAM LNCHR)																			
- RAM																			
VLS																			
- HARPOON																			
- TOMAHAWK																			
- ESS																			
- SM-2 MR																			
- VLA																			
SVTT																			
- MK 50																			
SRBOC																			
NIXIE																			
EOD TEAM																			
Oper. Requirements																			
A1	X	X						X	X			X	X						
A2																			
A3	X							X				X							
A4																			
A5																			
A6																			
A7																			
A8																			
A9																			
A10	X	X	X	X	X	X	X												
A11																			
A12																			
A13																			
B1								X	X	X	X								
B2												X	X	X	X	X	X	X	X
B3																			
B4																			
B5																			
B6																			
B7	X	X	X	X	X	X	X												

Elements	ELT								SAR						OTW			
Navy Option 1	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn.	Command	Voice Comm	Display	Identify	Track	Correlate	Command	Voice Comm	Identify	Display	Command
SPY-1D																		
SPS-67																		
TAS																		
SQR-19																		
SQS-56					X	X						X	X					
SH-100																		
SLQ-32		X	X	X						X	X					X	X	
VIDEO/OPTICAL		X	X	X		X				X	X		X			X	X	
ACDS		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
CEC																		
JMICS		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
LAMPS			X	X	X	X					X	X	X			X		
SMALL BOATS			X	X	X	X					X	X	X			X		
IFF			X	X		X					X		X			X		
MK 99																		
- SPG-62																		
Mk 34 GFCS		X			X	X	X			X		X	X				X	
- SPG-60/SPQ-9		X		X	X		X			X		X				X	X	
IR Mk-46		X	X	X						X	X					X	X	
SQQ-89																		
- Mk-309 ASWFC																		
VOICE COMMS	X						X	X	X					X	X			X
GPS																		
TACAN								X						X				
RING INFORMATION NET.		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
WCS							X	X						X				X
ISDS																		
155 mm GUN																		
CIWS (2)																		
Mk 49 (RAM LNCHR)																		
- RAM																		
VLS																		
- HARPOON																		
- TOMAHAWK																		
- ESS																		
- SM-2 MR																		
- VLA																		
SVTT																		
- MK 50																		
SRBOC																		
NIXIE																		
EOD TEAM																		
Oper. Requirements																		
A1	X	X							X	X					X			
A2																		
A3	X								X						X			
A4	X	X	X	X	X	X	X	X										
A5																		
A6																		
A7									X	X	X	X	X	X	X	X	X	X
A8																		
A9																		
A10																		
A11																		
A12																		
A13																		
B1																		
B2																		
B3																		
B4																X	X	X	X
B5																		
B6																		
B7																		

Elements	AAW					ASW			ASUW					MIW		STW		AMW				ELT							SAR			OTW		
Navy Option 1	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Weapon Delivery	Soft Kill	Kill Eval.	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Mark	Clear	Weapon Delivery	Kill Eval.	Illumination	Weapon Delivery	Guidance	Kill Eval.	Intercept	Board	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Platform Delivery	Evaluation	Facilities (Med. etc)	Platform Delivery	Evaluation	Facilities (Med. etc)
SPY-1D					X								X															X						
SPS-67					X								X															X						
TAS	X				X								X											X				X						
SQR-19								X																										
SQS-56								X																										
SH-100								X																										
SLQ-32				X	X							X	X														X	X						
VIDEO/OPTICAL					X								X								X							X						
ACDS																																		
CEC																																		
JMICS																																		
LAMPS					X	X		X					X								X	X	X					X	X	X		X	X	
SMALL BOATS													X			X						X	X					X	X	X		X	X	
IFF																																		
MK 99																																		
- SPG-62	X		X						X		X													X		X								
Mk 34 GFCS					X								X															X						
- SPG-60/SPQ-9	X		X						X		X							X		X				X		X								
IR Mk-46					X							X									X							X						
SQQ-89								X					X																					
- Mk-309 ASWFC								X					X																					
VOICE COMMS																																		
GPS																																		
TACAN																																		
RING INFORMATION NET.																																		
WCS																																		
ISDS																																		
155 mm GUN		X																																
CIWS (2)		X																																
Mk 49 (RAM LNCHR)		X																																
- RAM		X																																
VLS		X				X				X						X																		
- HARPOON										X																								
- TOMAHAWK																X																		
- ESS		X																																
- SM-2 MR		X																																
- VLA						X																												
SVTT						X																												
- MK 50						X																												
SRBOC				X								X															X							
NIXIE							X																											
EOD TEAM														X	X																X			X
Oper. Requirements																																		
A1																																		
A2																																		
A3																																		
A4									X	X	X	X	X									X	X	X	X	X	X	X						
A5					X	X		X					X								X	X	X					X	X	X		X	X	
A6													X									X	X					X	X	X		X	X	
A7																													X	X	X	X	X	X
A8																																		
A9																X	X																	
A10														X	X																X			X
A11																																		
A12																																		X
A13																																		
B1																X	X																	
B2																		X	X	X														
B3	X	X	X	X	X	X	X	X	X	X	X	X	X																					
B4	X	X	X	X	X	X	X	X	X	X	X	X	X											X	X	X	X	X						
B5	X	X	X	X	X																													
B6	X	X	X	X	X	X	X	X	X	X	X	X	X																					
B7														X	X																			

Table F-3: Functional Allocation - Engagement (Navy option 1)

Elements	AAW						ASW				ASUW						MIW			STW		AMW			ELT							SAR							OTW						
Navy Option 2	Vol Search	ESM	IR	Visual	Organic	Inorganic	Active	Passive	Organic	Inorganic	Surf Search	ESM	IR	Visual	Organic	Inorganic	Ship Board	Organic	Inorganic	Organic	Inorganic	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
XPAR	X										X														X	X						X	X						X	X					
SPS-67	X										X														X	X						X	X						X	X					
ATAS							X	X																																					
SH-100																	X																												
SLQ-32		X										X															X							X							X				
VIDEO/OPTICAL				X										X								X							X							X							X		
ACDS																																													
CEC																																													
JMICS																																													
PANTHER	X	X	X	X	X		X	X	X		X	X	X	X	X			X		X		X	X		X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
SMALL BOATS (2)														X	X			X		X		X	X						X	X						X	X						X	X	
IFF																																													
MK 99																																													
- SPG-62																																													
Mk 34 GFCS																																													
- SPG-60/SPQ-9	X										X														X	X						X	X						X	X					
IR MK-46			X										X															X							X							X			
SQQ-89																																													
- MK-116 ASWFC																																													
VOICE COMMS																																													
GPS																																													
TACAN																																													
RING INFO. NETWORK																																													
WCS																																													
ISDS																																													
127 mm GUN																																													
40 mm GUNS (2)																																													
VLS																																													
- HARPOON																																													
- TOMAHAWK																																													
- ESS																																													
- SM-2 MR																																													
- VLA																																													
SVTT																																													
- MK 50																																													
SRBOC																																													
NIXIE																																													
EOD TEAM																		X																											
Oper. Requirements																																													
A1																																													
A2	X	X	X	X	X		X	X	X		X	X	X	X	X										X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
A3																																													
A4											X	X	X	X	X										X	X	X	X	X	X															
A5					X				X						X					X			X							X							X							X	
A6					X				X						X					X			X							X							X							X	
A7																																X	X	X	X	X	X		X	X	X	X	X	X	
A8	X	X	X	X	X		X	X	X		X	X	X	X	X		X								X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
A9																																													
A10																	X	X																											
A11																																													
A12																																													
A13																																													
B1																				X																									
B2																						X	X																						
B3	X	X	X	X	X		X	X	X		X	X	X	X	X																														
B4	X	X	X	X	X		X	X	X		X	X	X	X	X																														
B5	X	X	X	X	X																																								
B6	X	X	X	X	X		X	X	X		X	X	X	X	X																														
B7																	X	X																											

Table F-4: Functional Allocation - Detection (Navy option 2)

Elements	AAW								ASW							
Navy Option 2	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn	Command
XPAR																
SPS-67																
ATAS											X	X	X	X		
SH-100										X	X	X	X	X		
SLQ-32		X	X	X			X									
VIDEO/OPTICAL		X	X	X		X										
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
CEC				X	X	X	X	X								
JMICS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
PANTHER			X	X	X	X					X	X	X	X		
SMALL BOATS (2)																
IFF			X	X		X										
MK 99					X	X	X									
- SPG-62																
Mk 34 GFCS		X			X	X	X									
- SPG-60/SPQ-9		X		X	X		X									
IR MK-46		X	X	X												
SQQ-89										X		X	X	X	X	
- MK-116 ASWFC										X		X	X	X	X	
VOICE COMMS	X						X	X	X						X	X
GPS								X								X
TACAN								X								X
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X	X
WCS							X	X							X	X
ISDS						X	X	X								
127 mm GUN																
40 mm GUNS (2)				X	X	X	X	X								
VLS																
- HARPOON																
- TOMAHAWK																
- ESS																
- SM-2 MR																
- VLA																
SVTT																
- MK 50																
SRBOC																
NIXIE																
EOD TEAM																
Oper. Requirements																
A1	X	X							X	X						
A2																
A3	X								X							
A4																
A5																
A6																
A7																
A8																
A9																
A10																
A11																
A12																
A13																
B1																
B2																
B3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B4																
B5	X	X	X	X	X	X	X	X								
B6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B7																

Elements	ASUW								MIW						
Navy Option 2	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Command
XPAR															
SPS-67															
ATAS															
SH-100										X	X	X	X	X	
SLQ-32		X	X	X											
VIDEO/OPTICAL		X	X	X		X									
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X
CEC															
JMICS		X	X	X	X	X	X	X		X	X	X	X	X	X
PANTHER			X	X	X	X					X	X	X	X	
SMALL BOATS (2)			X	X	X	X					X	X	X	X	
IFF			X	X		X									
MK 99															
- SPG-62															
Mk 34 GFCS		X			X	X	X								
- SPG-60/SPQ-9		X		X	X		X								
IR MK-46		X	X	X											
SQQ-89															
- MK-116 ASWFC															
VOICE COMMS	X						X	X	X						
GPS								X							
TACAN								X							X
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X
WCS							X	X							X
ISDS															
127 mm GUN															
40 mm GUNS (2)															
VLS															
- HARPOON															
- TOMAHAWK															
- ESS															
- SM-2 MR															
- VLA															
SVTT															
- MK 50															
SRBOC															
NIXIE															
EOD TEAM															
Oper. Requirements															
A1	X	X							X	X					
A2															
A3	X								X						
A4	X	X	X	X	X	X	X	X							
A5															
A6															
A7															
A8															
A9															
A10									X	X	X	X	X	X	X
A11															
A12															
A13															
B1															
B2															
B3	X	X	X	X	X	X	X	X							
B4															
B5															
B6	X	X	X	X	X	X	X	X							
B7									X	X	X	X	X	X	X

Elements	STW				AMW							
Navy Option 2	Voice Comms	Display	Identify	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn	Command
XPAR												
SPS-67												
ATAS												
SH-100												
SLQ-32		X	X			X	X	X				
VIDEO/OPTICAL		X	X			X	X	X		X		
ACDS		X	X	X		X	X	X	X	X	X	X
CEC												
JMICS		X	X	X		X	X	X	X	X	X	X
PANTHER							X	X	X	X		
SMALL BOATS (2)							X	X	X	X		
IFF												
MK 99												
- SPG-62												
Mk 34 GFCS						X			X	X	X	
- SPG-60/SPQ-9						X		X	X		X	
IR MK-46						X	X	X				
SQQ-89												
- MK-116 ASWFC												
VOICE COMMS	X			X	X						X	X
GPS				X								
TACAN												X
RING INFO. NETWORK		X	X	X		X	X	X	X	X	X	X
WCS				X							X	X
ISDS												
127 mm GUN												
40 mm GUNS (2)												
VLS												
- HARPOON												
- TOMAHAWK												
- ESS												
- SM-2 MR												
- VLA												
SVTT												
- MK 50												
SRBOC												
NIXIE												
EOD TEAM												
Oper. Requirements												
A1	X	X			X	X						
A2												
A3	X				X							
A4												
A5												
A6												
A7												
A8												
A9												
A10												
A11												
A12												
A13												
B1	X	X	X	X								
B2					X	X	X	X	X	X	X	X
B3												
B4												
B5												
B6												
B7												

Elements	ELT								SAR						OTW			
Navy Option 2	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assgn	Command	Voice Comm	Display	Identify	Track	Correlate	Command	Voice Comm	Identify	Display	Command
XPAR																		
SPS-67																		
ATAS																		
SH-100																		
SLQ-32		X	X	X						X	X					X	X	
VIDEO/OPTICAL		X	X	X		X				X	X		X			X	X	
ACDS		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
CEC																		
JMICS		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
PANTHER			X	X	X	X					X	X	X			X		
SMALL BOATS (2)			X	X	X	X					X	X	X			X		
IFF			X	X		X					X		X			X		
MK 99																		
- SPG-62																		
Mk 34 GFCS		X			X	X	X			X		X	X				X	
- SPG-60/SPQ-9		X		X	X		X			X		X				X	X	
IR MK-46		X	X	X						X	X					X	X	
SQQ-89																		
- MK-116 ASWFC																		
VOICE COMMS	X						X	X	X					X	X			X
GPS																		
TACAN								X						X				
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
WCS							X	X						X				X
ISDS																		
127 mm GUN																		
40 mm GUNS (2)																		
VLS																		
- HARPOON																		
- TOMAHAWK																		
- ESS																		
- SM-2 MR																		
- VLA																		
SVTT																		
- MK 50																		
SRBOC																		
NIXIE																		
EOD TEAM																		
Oper. Requirements																		
A1	X	X							X	X					X			
A2																		
A3	X								X						X			
A4	X	X	X	X	X	X	X	X										
A5																		
A6																		
A7									X	X	X	X	X	X	X	X	X	X
A8																		
A9																		
A10																		
A11																		
A12																		
A13																		
B1																		
B2																		
B3																		
B4															X	X	X	X
B5																		
B6																		
B7																		

Table F-5: Functional Allocation - Control (Navy option 2)

Elements	AAW					ASW			ASUW					MIW		STW		AMW				ELT							SAR			OTW		
Navy Option 2	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Weapon Delivery	Soft Kill	Kill Eval.	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Mark	Clear	Weapon Delivery	Kill Eval.	Illumination	Weapon Delivery	Guidance	Kill Eval.	Intercept	Board	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Platform Delivery	Evaluation	Facilities (Med. et	Platform Delivery	Evaluation	Facilities (Med. et
XPAR					X								X															X						
SPS-67					X								X															X						
ATAS								X																										
SH-100								X																										
SLQ-32				X	X							X	X														X	X						
VIDEO/OPTICAL					X								X								X							X						
ACDS																																		
CEC																																		
JMICS																																		
LAMPS					X	X		X					X								X	X	X					X	X	X		X	X	
SMALL BOATS (2)													X			X						X	X					X	X	X		X	X	
IFF																																		
MK 99																																		
- SPG-62	X		X						X		X													X		X								
Mk 34 GFCS					X								X															X						
- SPG-60/SPQ-9	X		X						X		X							X		X				X		X								
IR MK-46					X							X									X							X						
SQQ-89								X					X																					
- MK-116 ASWFC								X					X																					
VOICE COMMS																																		
GPS																																		
TACAN																																		
RING INFO. NETWORK																																		
WCS																																		
ISDS																																		
127 mm GUN		X																																
40 mm GUNS (2)		X																																
VLS		X				X				X						X																		
- HARPOON										X																								
- TOMAHAWK																X																		
- ESS		X																																
- SM-2 MR		X																																
- VLA						X																												
SVTT						X																												
- MK 50						X																												
SRBOC				X								X															X							
NIXIE							X																											
EOD TEAM														X	X																X			X
Oper. Requirements																																		
A1																																		
A2																																		
A3																																		
A4									X	X	X	X	X									X	X	X	X	X	X	X						
A5					X	X		X					X								X	X	X					X	X	X		X	X	
A6													X									X	X					X	X	X		X	X	
A7																													X	X	X	X	X	X
A8																																		
A9																X	X																	
A10														X	X																X			X
A11																																		
A12																																		X
A13																																		
B1																X	X																	
B2																		X	X	X														
B3	X	X	X	X	X	X	X	X	X	X	X	X	X																					
B4	X	X	X	X	X	X	X	X	X	X	X	X	X											X	X	X	X	X						
B5	X	X	X	X	X																													
B6	X	X	X	X	X	X	X	X	X	X	X	X	X																					
B7														X	X																			

Table F-6: Functional Allocation - Engagement (Navy option 2)

Elements	AAW						ASW				ASUW					
Navy Option 3	Vol Search	ESM	IR	Visual	Organic	Inorganic	Active	Passive	Organic	Inorganic	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPS-49	X										X					
SPS-67	X										X					
TAS	X										X					
SQR-19								X								
SUTEC DOUBLE EAGLE							X	X				X				
SLQ-32		X										X				
VIDEO/OPTICAL				X										X		
ACDS																
CEC																
JMICS																
PANTHER	X	X	X	X	X		X	X	X		X	X	X	X	X	
SMALL BOATS (2)														X	X	
IFF																
MK 86 GFCS																
- SPG-60/SPQ-9	X										X					
IR MK-46			X										X			
SQQ-89																
VOICE COMMS																
GPS																
TACAN																
RING INFO. NETWORK																
WCS																
ISDS																
127 mm GUN																
40 mm GUNS (2)																
CANNISTER																
- HARPOON																
ABL																
- TOMAHAWK																
MK49 (RAM LNCHER)																
- RAM																
SVTT																
- MK 50																
SRBOC																
NIXIE																
EOD TEAM																
Oper. Requirements																
A1																
A2	X	X	X	X	X		X	X	X		X	X	X	X	X	
A3																
A4											X	X	X	X	X	
A5					X				X						X	
A6					X				X						X	
A7																
A8	X	X	X	X	X		X	X	X		X	X	X	X	X	
A9																
A10																
A11																
A12																
A13																
B1																
B2																
B3	X	X	X	X	X		X	X	X		X	X	X	X	X	
B4	X	X	X	X	X		X	X	X		X	X	X	X	X	
B5	X	X	X	X	X											
B6	X	X	X	X	X		X	X	X		X	X	X	X	X	
B7																

Elements	MIW			STW		AMW			ELT						
Navy Option 3	Ship Board	Organic	Inorganic	Organic	Inorganic	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPS-49									X	X					
SPS-67									X	X					
TAS									X	X					
SQR-19															
SUTEC DOUBLE EAGLE	X														
SLQ-32											X				
VIDEO/OPTICAL						X							X		
ACDS															
CEC															
JMICS															
PANTHER		X		X		X	X		X	X	X	X	X	X	
SMALL BOATS (2)		X		X		X	X						X	X	
IFF															
MK 86 GFCS															
- SPG-60/SPQ-9									X	X					
IR MK-46												X			
SQQ-89															
VOICE COMMS															
GPS															
TACAN															
RING INFO. NETWORK															
WCS															
ISDS															
127 mm GUN															
40 mm GUNS (2)															
CANNISTER															
- HARPOON															
ABL															
- TOMAHAWK															
MK49 (RAM LNCHER)															
- RAM															
SVTT															
- MK 50															
SRBOC															
NIXIE															
EOD TEAM		X													
Oper. Requirements															
A1															
A2									X	X	X	X	X	X	
A3															
A4									X	X	X	X	X	X	
A5				X			X							X	
A6				X			X							X	
A7															
A8	X								X	X	X	X	X	X	
A9															
A10	X	X													
A11															
A12															
A13															
B1				X											
B2						X	X								
B3															
B4															
B5															
B6															
B7	X	X													

Elements	SAR							OTW						
Navy Option 3	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPS-49	X	X						X	X					
SPS-67	X	X						X	X					
TAS	X	X						X	X					
SQR-19														
SUTEC DOUBLE EAGLE														
SLQ-32			X							X				
VIDEO/OPTICAL					X							X		
ACDS														
CEC														
JMICS														
PANTHER	X	X	X	X	X	X		X	X	X	X	X	X	
SMALL BOATS (2)					X	X						X	X	
IFF														
MK 86 GFCS														
- SPG-60/SPQ-9	X	X						X	X					
IR MK-46				X							X			
SQQ-89														
VOICE COMMS														
GPS														
TACAN														
RING INFO. NETWORK														
WCS														
ISDS														
127 mm GUN														
40 mm GUNS (2)														
CANNISTER														
- HARPOON														
ABL														
- TOMAHAWK														
MK49 (RAM LNCHER)														
- RAM														
SVTT														
- MK 50														
SRBOC														
NIXIE														
EOD TEAM														
Oper. Requirements														
A1														
A2	X	X	X	X	X	X		X	X	X	X	X	X	
A3														
A4														
A5						X							X	
A6						X							X	
A7	X	X	X	X	X	X		X	X	X	X	X	X	
A8	X	X	X	X	X	X		X	X	X	X	X	X	
A9														
A10														
A11														
A12														
A13														
B1														
B2														
B3														
B4														
B5														
B6														
B7														

Table F-7: Functional Allocation - Detection (Navy option 3)

Elements	AAW								ASW							
Navy Option 3	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command
SPS-49																
SPS-67																
TAS																
SQR-19											X	X	X	X		
SUTEC DOUBLE EAGLE										X	X	X	X	X		
SLQ-32		X	X	X			X									
VIDEO/OPTICAL		X	X	X		X										
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
CEC				X	X	X	X	X								
JMICS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
PANTHER			X	X	X	X					X	X	X	X		
SMALL BOATS (2)																
IFF			X	X		X										
MK 86 GFCS		X			X	X	X									
- SPG-60/SPQ-9		X		X	X		X									
IR MK-46		X	X	X												
SQQ-89										X		X	X	X	X	
VOICE COMMS	X						X	X	X						X	X
GPS								X								X
TACAN								X								X
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X	X
WCS							X	X							X	X
ISDS						X	X	X								
127 mm GUN																
40 mm GUNS (2)				X	X	X	X	X								
CANNISTER																
- HARPOON																
ABL																
- TOMAHAWK																
MK49 (RAM LNCHER)																
- RAM																
SVTT																
- MK 50																
SRBOC																
NIXIE																
EOD TEAM																
Oper. Requirements																
A1	X	X							X	X						
A2																
A3	X								X							
A4																
A5																
A6																
A7																
A8																
A9																
A10																
A11																
A12																
A13																
B1																
B2																
B3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B4																
B5	X	X	X	X	X	X	X	X								
B6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B7																

Elements	ASUW								MIW						
Navy Option 3	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Command
SPS-49															
SPS-67															
TAS															
SQR-19															
SUTEC DOUBLE EAGLE										X	X	X	X	X	
SLQ-32		X	X	X											
VIDEO/OPTICAL		X	X	X		X									
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X
CEC															
JMICS		X	X	X	X	X	X	X		X	X	X	X	X	X
PANTHER			X	X	X	X					X	X	X	X	
SMALL BOATS (2)			X	X	X	X					X	X	X	X	
IFF			X	X		X									
MK 86 GFCS		X			X	X	X								
- SPG-60/SPQ-9		X		X	X		X								
IR MK-46		X	X	X											
SQQ-89															
VOICE COMMS	X						X	X	X						
GPS								X							
TACAN								X							X
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X
WCS							X	X							X
ISDS															
127 mm GUN															
40 mm GUNS (2)															
CANNISTER															
- HARPOON															
ABL															
- TOMAHAWK															
MK49 (RAM LNCHER)															
- RAM															
SVTT															
- MK 50															
SRBOC															
NIXIE															
EOD TEAM															
Oper. Requirements															
A1	X	X							X	X					
A2															
A3	X								X						
A4	X	X	X	X	X	X	X	X							
A5															
A6															
A7															
A8															
A9															
A10									X	X	X	X	X	X	X
A11															
A12															
A13															
B1															
B2															
B3	X	X	X	X	X	X	X	X							
B4															
B5															
B6	X	X	X	X	X	X	X	X							
B7									X	X	X	X	X	X	X

Elements	STW				AMW							
Navy Option 3	Voice Comms	Display	Identify	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command
SPS-49												
SPS-67												
TAS												
SQR-19												
SUTEC DOUBLE EAGLE												
SLQ-32		X	X			X	X	X				
VIDEO/OPTICAL		X	X			X	X	X		X		
ACDS		X	X	X		X	X	X	X	X	X	X
CEC												
JMICS		X	X	X		X	X	X	X	X	X	X
PANTHER							X	X	X	X		
SMALL BOATS (2)							X	X	X	X		
IFF												
MK 86 GFCS						X			X	X	X	
- SPG-60/SPQ-9						X		X	X		X	
IR MK-46						X	X	X				
SQQ-89												
VOICE COMMS	X			X	X						X	X
GPS				X								
TACAN												X
RING INFO. NETWORK		X	X	X		X	X	X	X	X	X	X
WCS				X							X	X
ISDS												
127 mm GUN												
40 mm GUNS (2)												
CANNISTER												
- HARPOON												
ABL												
- TOMAHAWK												
MK49 (RAM LNCHER)												
- RAM												
SVTT												
- MK 50												
SRBOC												
NIXIE												
EOD TEAM												
Oper. Requirements												
A1	X	X			X	X						
A2												
A3	X				X							
A4												
A5												
A6												
A7												
A8												
A9												
A10												
A11												
A12												
A13												
B1	X	X	X	X								
B2					X	X	X	X	X	X	X	X
B3												
B4												
B5												
B6												
B7												

Elements	ELT								SAR						OTW			
Navy Option 3	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Track	Correlate	Command	Voice Comm	Identify	Display	Command
SPS-49																		
SPS-67																		
TAS																		
SQR-19																		
SUTEC DOUBLE EAGLE																		
SLQ-32		X	X	X						X	X					X	X	
VIDEO/OPTICAL		X	X	X		X				X	X		X			X	X	
ACDS		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
CEC																		
JMICS		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
PANTHER			X	X	X	X					X	X	X			X		
SMALL BOATS (2)			X	X	X	X					X	X	X			X		
IFF			X	X		X					X		X			X		
MK 86 GFCS		X			X	X	X			X		X	X				X	
- SPG-60/SPQ-9		X		X	X		X			X		X				X	X	
IR MK-46		X	X	X						X	X					X	X	
SQQ-89																		
VOICE COMMS	X						X	X	X					X	X			X
GPS																		
TACAN								X						X				
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
WCS							X	X						X				X
ISDS																		
127 mm GUN																		
40 mm GUNS (2)																		
CANNISTER																		
- HARPOON																		
ABL																		
- TOMAHAWK																		
MK49 (RAM LNCHER)																		
- RAM																		
SVTT																		
- MK 50																		
SRBOC																		
NIXIE																		
EOD TEAM																		
Oper. Requirements																		
A1	X	X							X	X					X			
A2																		
A3	X								X						X			
A4	X	X	X	X	X	X	X	X										
A5																		
A6																		
A7									X	X	X	X	X	X	X	X	X	X
A8																		
A9																		
A10																		
A11																		
A12																		
A13																		
B1																		
B2																		
B3																		
B4															X	X	X	X
B5																		
B6																		
B7																		

Table F-8: Functional Allocation - Control (Navy option 3)

Elements	AAW					ASW			ASUW					MIW		STW		AMW				ELT							SAR			OTW		
Navy Option 3	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Weapon Delivery	Soft Kill	Kill Eval.	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Mark	Clear	Weapon Delivery	Kill Eval.	Illumination	Weapon Delivery	Guidance	Kill Eval.	Intercept	Board	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Platform Delivery	Evaluation	Facilities (Med. et	Platform Delivery	Evaluation	Facilities (Med. et
SPS-49					X								X															X						
SPS-67					X								X															X						
TAS	X				X								X											X				X						
SQR-19								X																										
SUTEC DOUBLE EAGLE								X																										
SLQ-32				X	X							X	X														X	X						
VIDEO/OPTICAL					X								X								X							X						
ACDS																																		
CEC																																		
JMICS																																		
PANTHER					X	X		X					X								X	X	X					X	X	X		X	X	
SMALL BOATS (2)													X			X						X	X					X	X	X		X	X	
IFF																																		
MK 86 GFCS					X								X															X						
- SPG-60/SPQ-9	X		X						X		X							X		X				X		X								
IR MK-46					X							X									X							X						
SQQ-89								X					X																					
VOICE COMMS																																		
GPS																																		
TACAN																																		
RING INFO. NETWORK																																		
WCS																																		
ISDS																																		
127 mm GUN		X																																
40 mm GUNS (2)		X																																
CANNISTER										X																								
- HARPOON										X																								
ABL																X																		
- TOMAHAWK																X																		
MK49 (RAM LNCHER)		X																																
- RAM		X																																
SVTT						X																												
- MK 50						X																												
SRBOC				X								X															X							
NIXIE							X																											
EOD TEAM														X	X																X			X
Oper. Requirements																																		
A1																																		
A2																																		
A3																																		
A4									X	X	X	X	X									X	X	X	X	X	X	X						
A5					X	X		X					X								X	X	X					X	X	X		X	X	
A6													X									X	X					X	X	X		X	X	
A7																													X	X	X	X	X	X
A8																																		
A9																X	X																	
A10														X	X																X			X
A11																																		
A12																																		X
A13																																		
B1																X	X																	
B2																		X	X	X														
B3	X	X	X	X	X	X	X	X	X	X	X	X	X																					
B4	X	X	X	X	X	X	X	X	X	X	X	X	X											X	X	X	X	X						
B5	X	X	X	X	X																													
B6	X	X	X	X	X	X	X	X	X	X	X	X	X																					
B7														X	X																			

Table F-9: Functional Allocation - Engagement (Navy option 3)

Elements	AAW						ASW				ASUW					
Coast Guard Option 1	Vol Search	ESM	IR	Visual	Organic	Inorganic	Active	Passive	Organic	Inorganic	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPY-1D	X										X					
SPS-67	X										X					
TAS	X										X					
SQS-56							X	X				X				
SH-100																
SLQ-32		X										X				
VIDEO/OPTICAL				X				X						X		
ACDS																
CEC																
JMCIS																
DOLPHIN	X	X	X	X	X		X	X	X		X	X	X	X	X	
SMALL BOATS (4)									X					X	X	
IFF																
MK 92 GFCS																
CAS/STIR	X										X					
IR Mk-46			X										X			
SQQ-89																
Mk-309 ASWFC																
VOICE COMMS																
GPS																
TACAN																
RING INFO. NETWORK																
WCS																
ISDS																
76 MM																
CIWS (1)																
Mk 49 (RAM LNCHR)																
RAM																
SVTT																
MK 50																
SRBOC																
NIXIE																
BUOY EQUIP																
EOD TEAM																
Requirements																
A1																
A2	X	X	X	X	X		X	X	X		X	X	X	X	X	
A3																
A4											X	X	X	X	X	
A5					X				X							
A6					X				X							
A7																
A8	X	X	X	X	X						X	X	X	X	X	
A9																
A10																
A11																
A12																
A13																
C1	X	X	X	X	X						X	X	X	X	X	
C2	X	X	X	X	X						X	X	X	X	X	
C3	X	X	X	X	X		X	X	X		X	X	X	X	X	
C4																
C5																
C6																
C7																
C8	X	X	X	X	X						X	X	X	X	X	

Elements	MIW			STW		AMW			ELT						
Coast Guard Option 1	Ship Board	Organic	Inorganic	Organic	Inorganic	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPY-1D									X	X					
SPS-67									X	X					
TAS															
SQS-56	X														
SH-100	X														
SLQ-32											X				
VIDEO/OPTICAL	X					X							X		
ACDS															
CEC															
JMCIS															
DOLPHIN		X		X		X	X		X	X	X	X	X	X	
SMALL BOATS (4)		X		X		X	X						X	X	
IFF															
MK 92 GFCS															
CAS/STIR									X	X					
IR Mk-46							X					X			
SQQ-89															
Mk-309 ASWFC															
VOICE COMMS															
GPS															
TACAN															
RING INFO. NETWORK															
WCS															
ISDS															
76 MM															
CIWS (1)															
Mk 49 (RAM LNCHR)															
RAM															
SVTT															
MK 50															
SRBOC															
NIXIE															
BUOY EQUIP															
EOD TEAM			X												
Requirements															
A1															
A2	X								X	X	X	X	X	X	
A3															
A4									X	X	X	X	X	X	
A5		X												X	
A6		X												X	
A7															
A8									X	X	X	X	X	X	
A9															
A10	X	X													
A11															
A12															
A13															
C1									X	X	X	X	X	X	
C2									X	X	X	X	X	X	
C3									X	X	X	X	X	X	
C4	X	X	X												
C5															
C6															
C7															
C8									X	X	X	X	X	X	

Elements	SAR							OTW						
Coast Guard Option 1	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPY-1D	X	X						X	X					
SPS-67	X	X						X	X					
TAS														
SQS-56														
SH-100														
SLQ-32			X							X				
VIDEO/OPTICAL					X							X		
ACDS														
CEC														
JMCIS														
DOLPHIN	X	X	X	X	X	X		X	X	X	X	X	X	
SMALL BOATS (4)					X	X						X	X	
IFF														
MK 92 GFCS														
CAS/STIR	X	X						X	X					
IR Mk-46				X							X			
SQQ-89														
Mk-309 ASWFC														
VOICE COMMS														
GPS														
TACAN														
RING INFO. NETWORK														
WCS														
ISDS														
76 MM														
CIWS (1)														
Mk 49 (RAM LNCHR)														
RAM														
SVTT														
MK 50														
SRBOC														
NIXIE														
BUOY EQUIP														
EOD TEAM														
Requirements														
A1														
A2	X	X	X	X	X	X		X	X	X	X	X	X	
A3														
A4														
A5						X							X	
A6						X							X	
A7	X	X	X	X	X	X		X	X	X	X	X	X	
A8														
A9														
A10														
A11														
A12														
A13														
C1														
C2														
C3														
C4														
C5														
C6														
C7														
C8														

Table F-10: Functional Allocation - Detection (Coast Guard option 1)

Elements	AAW								ASW							
Coast Guard Option 1	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command
SPY-1D																
SPS-67																
TAS																
SQS-56										X	X	X	X	X		
SH-100																
SLQ-32		X	X	X		X	X				X	X		X		
VIDEO/OPTICAL			X			X					X	X		X		
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
CEC				X	X	X	X	X								
JMCIS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
DOLPHIN			X	X		X			X		X	X	X	X		
SMALL BOATS (4)																
IFF			X	X		X										
MK 92 GFCS		X			X	X	X									
CAS/STIR					X	X										
IR Mk-46		X	X	X		X										
SQQ-89										X		X	X		X	X
Mk-309 ASWFC										X		X	X		X	X
VOICE COMMS	X						X	X	X						X	X
GPS								X								X
TACAN								X								X
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X	X
WCS							X	X							X	X
ISDS						X	X	X								
76 MM																
CIWS (1)				X	X		X	X								
Mk 49 (RAM LNCHR)																
RAM																
SVTT																
MK 50																
SRBOC																
NIXIE																
BUOY EQUIP																
EOD TEAM																
Requirements																
A1	X	X														
A2																
A3	X															
A4																
A5																
A6																
A7																
A8																
A9																
A10																
A11																
A12																
A13																
C1		X	X	X	X	X	X	X								
C2		X	X	X	X	X	X	X								
C3	X	X	X	X	X	X	X	X								
C4																
C5																
C6																
C7																
C8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Elements	ASUW								MIW							STW			
Coast Guard Option 1	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Command	Voice Comms	Display	Identify	Command
SPY-1D																			
SPS-67																			
TAS																			
SQS-56					X	X													
SH-100										X	X	X	X	X					
SLQ-32		X	X	X		X													
VIDEO/OPTICAL		X	X	X		X					X	X						X	
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X
CEC																			
JMCIS		X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X
DOLPHIN			X	X	X	X					X	X	X	X					
SMALL BOATS (4)			X	X	X	X					X	X	X	X					
IFF			X	X		X													
MK 92 GFCS		X			X	X	X												
CAS/STIR					X	X													
IR Mk-46		X	X	X		X													
SQQ-89																			
Mk-309 ASWFC																			
VOICE COMMS	X						X	X	X						X	X			X
GPS								X							X				
TACAN								X							X				
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X		X		X
WCS							X	X											
ISDS																			
76 MM																			
CIWS (1)																			
Mk 49 (RAM LNCHR)																			
RAM																			
SVTT																			
MK 50																			
SRBOC																			
NIXIE																			
BUOY EQUIP																			
EOD TEAM																			
Requirements																			
A1	X	X							X	X									
A2																			
A3	X								X										
A4	X	X	X	X	X	X	X	X											
A5																			
A6																			
A7																			
A8																			
A9																			
A10									X	X	X	X	X	X	X				
A11																			
A12																			
A13																			
C1		X	X	X	X	X	X	X											
C2		X	X	X	X	X	X	X											
C3	X	X	X	X	X	X	X	X											
C4									X	X	X	X	X	X	X				
C5																			
C6																			
C7																			
C8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				

Elements	AMW								ELT							
Coast Guard Option 1	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command
SPY-1D																
SPS-67																
TAS																
SQS-56													X	X		
SH-100																
SLQ-32										X	X	X		X		
VIDEO/OPTICAL		X	X	X						X	X	X	X	X		
ACDS		X	X	X	X	X				X	X	X	X	X	X	X
CEC																
JMCIS		X	X	X	X	X				X	X	X	X	X	X	X
DOLPHIN											X	X	X	X		
SMALL BOATS (4)											X	X	X	X		
IFF											X	X		X		
MK 92 GFCS										X			X	X	X	
CAS/STIR													X	X		
IR Mk-46										X	X	X		X		
SQQ-89																
Mk-309 ASWFC																
VOICE COMMS	X								X						X	X
GPS																X
TACAN																X
RING INFO. NETWORK		X	X	X	X	X				X	X	X	X	X	X	X
WCS															X	X
ISDS															X	X
76 MM																
CIWS (1)																
Mk 49 (RAM LNCHR)																
RAM																
SVTT																
MK 50																
SRBOC																
NIXIE																
BUOY EQUIP																
EOD TEAM																
Requirements																
A1									X	X						
A2																
A3									X							
A4									X	X	X	X	X	X	X	X
A5																
A6																
A7																
A8																
A9																
A10																
A11																
A12																
A13																
C1										X	X	X	X	X	X	X
C2										X	X	X	X	X	X	X
C3									X	X	X	X	X	X	X	X
C4																
C5																
C6																
C7																
C8									X	X	X	X	X	X	X	X

Elements	SAR						OTW			
Coast Guard Option 1	Voice Comm	Display	Identify	Track	Correlate	Command	Voice Comm	Identify	Display	Command
SPY-1D										
SPS-67										
TAS										
SQS-56				X	X					
SH-100										
SLQ-32		X	X		X					
VIDEO/OPTICAL			X	X	X					
ACDS		X	X	X	X	X		X	X	X
CEC										
JMCIS		X	X	X	X	X		X	X	X
DOLPHIN			X	X	X			X		
SMALL BOATS (4)			X	X	X			X		
IFF			X		X			X		
MK 92 GFCS		X		X	X				X	
CAS/STIR				X	X					
IR Mk-46		X	X		X			X		
SQQ-89										
Mk-309 ASWFC										
VOICE COMMS	X					X	X	X	X	X
GPS						X				
TACAN						X				
RING INFO. NETWORK		X	X	X	X	X		X	X	X
WCS										
ISDS										
76 MM										
CIWS (1)										
Mk 49 (RAM LNCHR)										
RAM										
SVTT										
MK 50										
SRBOC										
NIXIE										
BUOY EQUIP										
EOD TEAM										
Requirements										
A1	X	X					X		X	
A2										
A3							X			
A4										
A5										
A6										
A7	X	X	X	X	X	X	X	X	X	X
A8										
A9										
A10										
A11										
A12										
A13										
C1		X	X	X	X	X				
C2		X	X	X	X	X				
C3	X	X	X	X	X	X				
C4										
C5										
C6										
C7										
C8	X	X	X	X	X	X				

Table F-11: Functional Allocation - Control (Coast Guard option 1)

Elements	AAW					ASW			ASUW					MIW		STW		AMW				ELT							SAR			OTW		
Coast Guard Option 1	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Weapon Delivery	Soft Kill	Kill Eval.	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Mark	Clear	Weapon Delivery	Kill Eval.	Illumination	Weapon Delivery	Guidance	Kill Eval.	Intercept	Board	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Platform Delivery	Evaluation	Facilities (Med. et	Platform Delivery	Evaluation	Facilities (Med. et
SPY-1D					X								X															X						
SPS-67					X								X															X						
TAS	X				X								X											X				X						
SQS-56								X																										
SH-100																																		
SLQ-32				X	X							X	X														X	X						
VIDEO/OPTICAL					X								X								X							X		X			X	
ACDS																																		
CEC																																		
JMCIS																																		
DOLPHIN						X		X					X								X	X	X					X	X	X		X	X	
SMALL BOATS (4)													X			X						X	X		X			X	X	X		X	X	
IFF																																		
MK 92 GFCS					X								X															X						
CAS/STIR	X								X									X						X										
IR Mk-46					X								X															X						
SQQ-89								X																										
Mk-309 ASWFC								X																										
VOICE COMMS																																		
GPS																																		
TACAN																																		
RING INFO. NETWORK																																		
WCS																																		
ISDS																																		
76 MM		X								X															X									
CIWS (1)		X																																
Mk 49 (RAM LNCHR)		X																																
RAM		X																																
SVTT						X																												
MK 50						X																												
SRBOC				X								X															X							
NIXIE							X																											
BUOY EQUIP														X																		X		
EOD TEAM															X																X			X
Requirements																																		
A1																																		
A2																																		
A3																																		
A4									X	X		X										X	X	X	X	X	X	X						
A5						X		X					X								X	X	X		X			X	X	X		X	X	
A6													X			X						X	X		X			X	X	X		X	X	
A7																													X	X	X	X	X	X
A8																																		
A9																X																		
A10															X																X			X
A11																																		
A12																																		X
A13																																		
C1	X	X		X	X	X	X	X	X	X		X	X									X	X	X	X	X	X	X						
C2	X	X		X	X	X	X	X	X	X		X	X											X	X	X	X	X						
C3	X	X		X	X	X	X	X	X	X		X	X											X	X	X	X	X						
C4														X	X																			
C5																															X			
C6																																X		
C7																																		X
C8	X	X		X	X	X	X	X	X	X		X	X	X	X								X	X	X	X	X	X	X	X	X	X	X	X

Table F-12: Functional Allocation - Engagement (Coast Guard option 1)

Elements	AAW						ASW				ASUW						MIW			STW		AMW			ELT							SAR							OTW						
Coast Guard Option 2	Vol Search	ESM	IR	Visual	Organic	Inorganic	Active	Passive	Organic	Inorganic	Surf Search	ESM	IR	Visual	Organic	Inorganic	Ship Board	Organic	Inorganic	Organic	Inorganic	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
XPAR	X										X														X	X						X	X						X	X					
SPS-67	X										X														X	X						X	X						X	X					
TAS	X										X																																		
SH-100																	X																												
SLQ-32		X										X															X							X							X				
VIDEO/OPTICAL				X				X						X			X					X							X							X							X		
ACDS																																													
CEC																																													
JMCIS																																													
DOLPHIN	X	X	X	X	X		X	X	X		X	X	X	X	X			X		X		X	X		X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
SMALL BOATS (4)									X					X	X			X		X		X	X						X	X						X	X						X	X	
IFF																																													
GFCS																																													
GFCS RADAR	X										X														X	X						X	X						X	X					
IR Mk-46			X										X										X					X							X							X			
VOICE COMMS																																													
GPS																																													
TACAN																																													
RING INFO. NETWORK																																													
WCS																																													
ISDS																																													
40 MM GUNS (2)																																													
Mk 49 (RAM LNCHR)																																													
RAM																																													
SRBOC																																													
NIXIE																																													
BUOY EQUIP																																													
EOD TEAM																			X																										
Requirements																																													
A1																																													
A2	X	X	X	X	X		X	X	X		X	X	X	X	X		X								X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
A3																																													
A4											X	X	X	X	X										X	X	X	X	X	X															
A5					X				X									X												X							X							X	
A6					X				X									X												X							X							X	
A7																																X	X	X	X	X	X		X	X	X	X	X	X	
A8	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															
A9																																													
A10																	X	X																											
A11																																													
A12																																													
A13																																													
C1	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															
C2	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															
C3	X	X	X	X	X		X	X	X		X	X	X	X	X										X	X	X	X	X	X															
C4																	X	X	X																										
C5																																													
C6																																													
C7																																													
C8	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															

Table F-13: Functional Allocation - Detection (Coast Guard option 2)

Elements	AAW								ASW								ASUW								MIW							STW				AMW								ELT								SAR						OTW			
Coast Guard Option 2	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Command	Voice Comms	Display	Identify	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Track	Correlate	Command	Voice Comm.	Identify	Display	Command
XPAR																																																													
SPS-67																																																													
TAS																																																													
SH-100																										X	X	X	X	X																															
SLQ-32		X	X	X		X	X				X	X		X				X	X	X		X																							X	X	X		X				X	X		X					
VIDEO/OPTICAL			X			X					X	X		X				X	X	X		X					X	X						X			X	X	X						X	X	X	X	X					X	X	X					
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X	X	X				X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
CEC				X	X	X	X	X																																																					
JMCIS		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X	X	X				X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
DOLPHIN			X	X		X			X		X	X	X	X					X	X	X	X					X	X	X	X																X	X	X	X					X	X	X			X		
SMALL BOATS (4)																			X	X	X	X					X	X	X	X																X	X	X	X					X	X	X			X		
IFF			X	X		X													X	X		X																								X	X		X					X		X			X		
GFCS		X			X	X	X											X			X	X	X																						X			X	X	X			X		X	X				X	
GFCS RADAR					X	X															X	X																										X	X						X	X					
IR Mk-46		X	X	X		X												X	X	X		X																							X	X	X		X				X	X		X			X		
VOICE COMMS	X						X	X	X						X	X	X						X	X	X						X	X			X	X								X						X	X	X					X	X	X	X	X
GPS								X								X								X							X																				X						X				
TACAN								X								X								X							X																				X						X				
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X		X		X		X	X	X	X	X				X	X	X	X	X	X	X		X	X	X	X	X		X	X	X
WCS							X	X							X	X							X	X																										X	X										
ISDS						X	X	X																																										X	X										
40 MM GUNS (2)				X	X		X	X																																																					
Mk 49 (RAM LNCHR)																																																													
RAM																																																													
SRBOC																																																													
NIXIE																																																													
BUOY EQUIP																																																													
EOD TEAM																																																													
Requirements																																																													
A1	X	X															X	X							X	X																		X	X							X	X					X		X	
A2																																																													
A3	X																X								X																			X														X			
A4																	X	X	X	X	X	X	X	X																				X	X	X	X	X	X	X	X										
A5																																																													
A6																																																													
A7																																																				X	X	X	X	X	X	X	X	X	X
A8																																																													
A9																																																													
A10																									X	X	X	X	X	X	X																														
A11																																																													
A12																																																													
A13																																																													
C1		X	X	X	X	X	X	X										X	X	X	X	X	X	X																					X	X	X	X	X	X	X		X	X	X	X	X				
C2		X	X	X	X	X	X	X										X	X	X	X	X	X	X																					X	X	X	X	X	X	X		X	X	X	X	X				
C3	X	X	X	X	X	X	X	X									X	X	X	X	X	X	X	X																				X	X	X	X	X	X	X	X	X	X	X	X	X	X				
C4																									X	X	X	X	X	X	X																														
C5																																																													
C6																																																													
C7																																																													
C8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X													X	X	X	X	X	X	X	X	X	X	X	X	X	X				

Table F-14: Functional Allocation - Control (Coast Guard option 2)

Elements	AAW					ASW			ASUW					MIW		STW		AMW				ELT							SAR			OTW		
Coast Guard Option 2	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Weapon Delivery	Soft Kill	Kill Eval.	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Mark	Clear	Weapon Delivery	Kill Eval.	Illumination	Weapon Delivery	Guidance	Kill Eval.	Intercept	Board	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Platform Delivery	Evaluation	Facilities (Med. et	Platform Delivery	Evaluation	Facilities (Med. et
XPAR					X								X															X						
SPS-67					X								X															X						
TAS	X				X								X											X				X						
SH-100																																		
SLQ-32				X	X							X	X														X	X						
VIDEO/OPTICAL					X								X								X							X		X			X	
ACDS																																		
CEC																																		
JMCIS																																		
DOLPHIN						X		X					X								X	X	X					X	X	X		X	X	
SMALL BOATS (4)													X			X						X	X		X			X	X	X		X	X	
IFF																																		
GFCS					X								X															X						
GFCS RADAR	X								X									X						X										
IR Mk-46					X								X															X						
VOICE COMMS																																		
GPS																																		
TACAN																																		
RING INFO. NETWORK																																		
WCS																																		
ISDS																																		
40 MM GUNS (2)		X								X															X									
Mk 49 (RAM LNCHR)		X																																
RAM		X																																
SRBOC				X								X															X							
NIXIE							X																											
BUOY EQUIP														X																		X		
EOD TEAM															X																X			X
Requirements																																		
A1																																		
A2																																		
A3																																		
A4									X	X		X										X	X	X	X	X	X	X						
A5						X		X					X								X	X	X		X			X	X	X		X	X	
A6													X			X						X	X		X			X	X	X		X	X	
A7																													X	X	X	X	X	X
A8																																		
A9																X																		
A10															X																X			X
A11																																		
A12																																		
A13																																		X
C1	X	X		X	X	X	X	X	X	X		X	X									X	X	X	X	X	X	X						
C2	X	X		X	X	X	X	X	X	X		X	X											X	X	X	X	X						
C3	X	X		X	X	X	X	X	X	X		X	X											X	X	X	X	X						
C4														X	X																			
C5																															X			
C6																																X		
C7																																		X
C8	X	X		X	X	X	X	X	X	X		X	X	X	X								X	X	X	X	X	X	X	X	X	X	X	X

Table F-15: Functonal Allocation - Engagement (Coast Guard option 2)

Elements	AAW						ASW				ASUW						MIW			STW		AMW			ELT							SAR							OTW						
Coast Guard Option 3	Vol Search	ESM	IR	Visual	Organic	Inorganic	Active	Passive	Organic	Inorganic	Surf Search	ESM	IR	Visual	Organic	Inorganic	Ship Board	Organic	Inorganic	Organic	Inorganic	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic	Vol. Search	Surf Search	ESM	IR	Visual	Organic	Inorganic
SPS-49	X										X														X	X						X	X						X	X					
SPS-67	X										X														X	X						X	X						X	X					
SUTEC DOUBLE EAGLE																		X																											
SLQ-32		X										X															X							X							X				
VIDEO/OPTICAL				X				X						X			X					X							X							X							X		
ACDS																																													
CEC																																													
JMCIS																																													
DOLPHIN	X	X	X	X	X		X	X	X		X	X	X	X	X			X		X		X	X		X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
SMALL BOATS (3)									X					X	X			X		X		X	X						X	X						X	X						X	X	
IFF																																													
GFCS																																													
GFCS RADAR	X										X														X	X						X	X						X	X					
IR Mk-46			X										X										X					X							X							X			
VOICE COMMS																																													
GPS																																													
TACAN																																													
RING INFO. NETWORK																																													
WCS																																													
ISDS																																													
40 MM GUN (1)																																													
STINGER																																													
SRBOC																																													
NIXIE																																													
BUOY EQUIP																																													
EOD TEAM																			X																										
Requirements																																													
A1																																													
A2	X	X	X	X	X		X	X	X		X	X	X	X	X		X								X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	
A3																																													
A4											X	X	X	X	X										X	X	X	X	X	X															
A5					X				X									X												X							X							X	
A6					X				X									X												X							X							X	
A7																																X	X	X	X	X	X		X	X	X	X	X	X	
A8	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															
A9																																													
A10																	X	X																											
A11																																													
A12																																													
A13																																													
C1	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															
C2	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															
C3	X	X	X	X	X		X	X	X		X	X	X	X	X										X	X	X	X	X	X															
C4																	X	X	X																										
C5																																													
C6																																													
C7																																													
C8	X	X	X	X	X						X	X	X	X	X										X	X	X	X	X	X															

Table F-16: Functional Allocation - Detection (Coast Guard option 3)

Elements	AAW								ASW							
Coast Guard Option 3	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command
SPS-49																
SPS-67																
SUTEC DOUBLE EAGLE																
SLQ-32		X	X	X		X	X				X	X		X		
VIDEO/OPTICAL			X			X					X	X		X		
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
CEC				X	X	X	X	X								
JMCIS		X	X	X	X	X	X	X		X	X	X	X	X	X	X
DOLPHIN			X	X		X			X		X	X	X	X		
SMALL BOATS (3)																
IFF			X	X		X										
GFCS		X			X	X	X									
GFCS RADAR					X	X										
IR Mk-46		X	X	X		X										
VOICE COMMS	X						X	X	X						X	X
GPS								X								X
TACAN								X								X
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X	X
WCS							X	X							X	X
ISDS						X	X	X								
40 MM GUN (1)				X	X		X	X								
STINGER																
SRBOC																
NIXIE																
BUOY EQUIP																
EOD TEAM																
Requirements																
A1	X	X														
A2																
A3	X															
A4																
A5																
A6																
A7																
A8																
A9																
A10																
A11																
A12																
A13																
C1		X	X	X	X	X	X	X								
C2		X	X	X	X	X	X	X								
C3	X	X	X	X	X	X	X	X								
C4																
C5																
C6																
C7																
C8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Elements	ASUW								MIW							STW			
Coast Guard Option 3	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Command	Voice Comms	Display	Identify	Command
SPS-49																			
SPS-67																			
SUTEC DOUBLE EAGLE										X	X	X	X	X					
SLQ-32		X	X	X		X													
VIDEO/OPTICAL		X	X	X		X					X	X						X	
ACDS		X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X
CEC																			
JMCIS		X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X
DOLPHIN			X	X	X	X					X	X	X	X					
SMALL BOATS (3)			X	X	X	X					X	X	X	X					
IFF			X	X		X													
GFCS		X			X	X	X												
GFCS RADAR					X	X													
IR Mk-46		X	X	X		X													
VOICE COMMS	X						X	X	X						X	X			X
GPS								X							X				
TACAN								X							X				
RING INFO. NETWORK		X	X	X	X	X	X	X		X	X	X	X	X	X		X		X
WCS							X	X											
ISDS																			
40 MM GUN (1)																			
STINGER																			
SRBOC																			
NIXIE																			
BUOY EQUIP																			
EOD TEAM																			
Requirements																			
A1	X	X							X	X									
A2																			
A3	X								X										
A4	X	X	X	X	X	X	X	X											
A5																			
A6																			
A7																			
A8																			
A9																			
A10									X	X	X	X	X	X	X				
A11																			
A12																			
A13																			
C1		X	X	X	X	X	X	X											
C2		X	X	X	X	X	X	X											
C3	X	X	X	X	X	X	X	X											
C4									X	X	X	X	X	X	X				
C5																			
C6																			
C7																			
C8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				

Elements	AMW								ELT							
Coast Guard Option 3	Voice Comms	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command	Voice Comm	Display	Identify	Threat Eval.	Track	Correlate	Weapons Assg	Command
SPS-49																
SPS-67																
SUTEC DOUBLE EAGLE																
SLQ-32										X	X	X		X		
VIDEO/OPTICAL		X	X	X						X	X	X	X	X		
ACDS		X	X	X	X	X				X	X	X	X	X	X	X
CEC																
JMCIS		X	X	X	X	X				X	X	X	X	X	X	X
DOLPHIN											X	X	X	X		
SMALL BOATS (3)											X	X	X	X		
IFF											X	X		X		
GFCS										X			X	X	X	
GFCS RADAR													X	X		
IR Mk-46										X	X	X		X		
VOICE COMMS	X								X						X	X
GPS																X
TACAN																X
RING INFO. NETWORK		X	X	X	X	X				X	X	X	X	X	X	X
WCS															X	X
ISDS															X	X
40 MM GUN (1)																
STINGER																
SRBOC																
NIXIE																
BUOY EQUIP																
EOD TEAM																
Requirements																
A1									X	X						
A2																
A3									X							
A4									X	X	X	X	X	X	X	X
A5																
A6																
A7																
A8																
A9																
A10																
A11																
A12																
A13																
C1										X	X	X	X	X	X	X
C2										X	X	X	X	X	X	X
C3									X	X	X	X	X	X	X	X
C4																
C5																
C6																
C7																
C8									X	X	X	X	X	X	X	X

Elements	SAR						OTW			
Coast Guard Option 3	Voice Comm	Display	Identify	Track	Correlate	Command	Voice Comm	Identify	Display	Command
SPS-49										
SPS-67										
SUTEC DOUBLE EAGLE										
SLQ-32		X	X		X					
VIDEO/OPTICAL			X	X	X					
ACDS		X	X	X	X	X		X	X	X
CEC										
JMCIS		X	X	X	X	X		X	X	X
DOLPHIN			X	X	X			X		
SMALL BOATS (3)			X	X	X			X		
IFF			X		X			X		
GFCS		X		X	X				X	
GFCS RADAR				X	X					
IR Mk-46		X	X		X			X		
VOICE COMMS	X					X	X	X	X	X
GPS						X				
TACAN						X				
RING INFO. NETWORK		X	X	X	X	X		X	X	X
WCS										
ISDS										
40 MM GUN (1)										
STINGER										
SRBOC										
NIXIE										
BUOY EQUIP										
EOD TEAM										
Requirements										
A1	X	X					X		X	
A2										
A3							X			
A4										
A5										
A6										
A7										
A8	X	X	X	X	X	X	X	X	X	X
A9										
A10										
A11										
A12										
A13										
C1		X	X	X	X	X				
C2		X	X	X	X	X				
C3	X	X	X	X	X	X				
C4										
C5										
C6										
C7										
C8	X	X	X	X	X	X				

Table F-17: Functional Allocation - Control (Coast Guard option 3)

Elements	AAW					ASW			ASUW					MIW		STW		AMW				ELT							SAR			OTW		
Coast Guard Option 3	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Weapon Delivery	Soft Kill	Kill Eval.	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Mark	Clear	Weapon Delivery	Kill Eval.	Illumination	Weapon Delivery	Guidance	Kill Eval.	Intercept	Board	Illumination	Weapon Delivery	Guidance	Soft Kill	Kill Eval.	Platform Delivery	Evaluation	Facilities (Med. et	Platform Delivery	Evaluation	Facilities (Med. et
SPS-49					X								X															X						
SPS-67					X								X															X						
SUTEC DOUBLE EAGLE																																		
SLQ-32				X	X							X	X														X	X						
VIDEO/OPTICAL					X								X								X							X		X			X	
ACDS																																		
CEC																																		
JMCIS																																		
DOLPHIN						X		X					X								X	X	X					X	X	X		X	X	
SMALL BOATS (3)													X			X						X	X		X			X	X	X		X	X	
IFF																																		
GFCS					X								X															X						
GFCS RADAR	X								X									X						X										
IR Mk-46					X								X															X						
VOICE COMMS																																		
GPS																																		
TACAN																																		
RING INFO. NETWORK																																		
WCS																																		
ISDS																																		
40 MM GUN (1)		X								X															X									
STINGER		X																																
SRBOC				X								X															X							
NIXIE							X																											
BUOY EQUIP														X																		X		
EOD TEAM															X																X			X
Requirements																																		
A1																																		
A2																																		
A3																																		
A4									X	X		X										X	X	X	X	X	X	X						
A5						X		X					X								X	X	X		X			X	X	X		X	X	
A6													X			X						X	X		X			X	X	X		X	X	
A7																													X	X	X	X	X	X
A8																																		
A9																X																		
A10															X																X			X
A11																																		
A12																																		X
A13																																		
C1	X	X		X	X	X	X	X	X	X		X	X									X	X	X	X	X	X	X						
C2	X	X		X	X	X	X	X	X	X		X	X											X	X	X	X	X						
C3	X	X		X	X	X	X	X	X	X		X	X											X	X	X	X	X						
C4														X	X																			
C5																															X			
C6																																X		
C7																																		X
C8	X	X		X	X	X	X	X	X	X		X	X	X	X								X	X	X	X	X	X	X	X	X	X	X	X

Table F-18: Functional Allocation - Engagement (Coast Guard option 3)

APPENDIX G

ELEMENT INTERFACE TABLES

SUMMARY

Element Interface tables were used to depict how each element in the system will be connected to other elements in the system and provided a basis on which to develop the Comabt System architecture. An element interface matrix was constructed for each whole ship option and are located in the tables listed below:

G-1: Element Interface Matrix (Navy option 1)
G-2: Element Interface Matrix (Navy option 2)
G-3: Element Interface Matrix (Navy option 3)
G-4: Element Interface Matrix (Coast Guard option 1)
G-5: Element Interface Matrix (Coast Guard option 2)
G-6: Element Interface Matrix (Coast Guard option 3)

Navy Option 1	SPY-1D	SPS-67	TAS	SQS-56	SQR-19	SH-100	SLQ-32	VIDEO/OPTICAL	ACDS	CEC	JMICS	PANTHER	SMALL BOATS (4)	IFF	MK 99	- SPG-62	Mk 34 GFCS	- SPG-60/SPQ-9	IR MK-46	SQQ-89	- Mk-309 ASWFC	VOICE COMMS	GPS	TACAN	RING INFO. NET.	WCS	ISDS	155 mm GUN	CIWS	Mk 49 (RAM LNCHR)	- RAM	VLS	- HARPOON	- TOMAHAWK	- ESS	- SM-2 MR	- VLA	SVTT	- MK 50	SRBOC	NIXIE	EOD TEAM
SPY-1D	X						L			D				E	D		D								D																	
SPS-67		X					L			D				E	D		D								D																	
TAS			X				L			D					D		D								D					D												
SQR-19				X																D	D				D																	
SQS-56					X															D	D				D																	
SH-100						X																			D																	L
SLQ-32	L	L	L				X																		D															L		
VIDEO/OPTICAL								X							D		D		D						D																	
ACDS									X																D																	
CEC	D	D	D							X															D																	
JMICS											X														D																	
PANTHER												X								D		E		D	D														EM			
SMALL BOATS (4)													X									E																				M
IFF	E	E												X											D																	
MK 99	D	D	D					D							X	D			D						D	D	D			D		D										
- SPG-62															D	X																										
Mk 34 GFCS	D	D	D					D									X	D	D						D	D	D	D														
- SPG-60/SPQ-9																	D	X																								
IR Mk-46								D							D		D		X						D																	
SQQ-89				D	D							D								X	D				D	D															ML	
- Mk-309 ASWFC				D	D															D	X				D	D						D						D	E			
VOICE COMMS												E	E									X																				E
GPS																							X		D																	D
TACAN												D												X																		
RING INFO. NETWORK	D	D	D	D	D	D	D	D	D	D	D			D	D		D	D	D	D	D		D		X	D	D		D											D		
WCS															D		D			D	D				D	X	D			L												
ISDS															D		D								D	D	X		D	D		D								D		
155 mm GUN																	D											X														
CIWS (2)																									D		D		X													
Mk 49 (RAM LNCHR)			D												D											L	D			X	EM											
- RAM																														EM	X											
VLS															D						D						D					X	EM	EM	EM	EM	EM					
- HARPOON																																EM	X									
- TOMAHAWK																																EM		X								
- ESS																																EM			X							
- SM-2 MR																																EM				X						
- VLA																																EM					X					
SVTT																					D																	X	EM			
- MK 50												EM									E																	EM	X			
SRBOC							L																		D		D													X		
NIXIE																				ML																					X	
EOD TEAM						L							M									E	D																			X
LEGEND	E=Electronic, M=Mechanical, D=Data, L=Logic																																									

Table G-1: Element Interface Matrix (Navy option 1)

Navy Option 2	XPAR	SPS-67	ATAS	SH-100	SLQ-32	VIDEO/OPTICAL	ACDS	CEC	JMICS	PANTHER	SMALL BOATS (2)	IFF	MK 99	- SPG-62	Mk 34 GFCS	- SPG-60/SPQ-9	IR MK-46	SQQ-89	- MK-116 ASWFC	VOICE COMMS	GPS	TACAN	RING INFO. NET.	WCS	ISDS	127 mm GUN	40 mm GUNS (2)	VLS	- HARPOON	- TOMAHAWK	- ESS	- SM-2 MR	- VLA	SVTT	- MK 50	SRBOC	NIXIE	EOD TEAM
XPAR	X				L			D				E	D		D								D															
SPS-67		X			L			D				E	D		D								D															
ATAS			X															D	D				D															
SH-100				X																			D															L
SLQ-32	L	L			X																		D													L		
VIDEO/OPTICAL						X							D		D		D						D															
ACDS							X																D															
CEC	D	D						X															D															
JMICS									X														D															
PANTHER										X								D		E		D	D												EM			
SMALL BOATS (2)											X									E																		M
IFF	E	E										X											D															
MK 99	D	D				D							X	D			D						D	D	D			D										
- SPG-62													D	X																								
Mk 34 GFCS	D	D				D									X	D	D						D	D	D	D												
- SPG-60/SPQ-9															D	X							D															
IR MK-46						D							D		D	X	X						D															
SQQ-89			D							D								X	D				D	D													ML	
- MK-116 ASWFC			D															D	X				D	D				D						D	E			
VOICE COMMS										E	E									X																		E
GPS																					X		D															D
TACAN										D												X																
RING INFO. NETWORK	D	D	D	D	D	D	D	D	D	D		D	D		D	D	D	D	D		D		X	D	D		D									D		
WCS													D		D			D	D				D	X	D													
ISDS													D		D								D	D	X		D	D								D		
127 mm GUN															D											X												
40 mm GUNS (2)																							D		D		X											
VLS													D						D						D			X	EM	EM	EM	EM	EM					
- HARPOON																												EM										
- TOMAHAWK																												EM		X								
- ESS																												EM			X							
- SM-2 MR																												EM				X						
- VLA																												EM					X					
SVTT																			D															X	EM			
- MK 50										EM									E															EM	X			
SRBOC					L																		D		D											X		
NIXIE																		ML																			X	
EOD TEAM				L							M									E	D																	X
LEGEND	E=Electronic, M=Mechanical, D=Data, L=Logic																																					

Table G-2: Element Interface Matrix (Navy option 2)

Navy Option 3	SPS-49	SPS-67	TAS	SQR-19	SUTEC DOUBLE EAGLE	SLQ-32	VIDEO/OPTICAL	ACDS	CEC	JMICS	PANTHER	SMALL BOATS (2)	IFF	MK 86 GFCS	- SPG-60/SPQ-9	IR MK-46	SQQ-89	VOICE COMMS	GPS	TACAN	RING INFO NETWORK	WCS	ISDS	127 mm GUN	40 mm GUNS (2)	CANNISTER	- HARPOON	ABL	- TOMAHAWK	MK-49 (RAM LAUNCHER)	- RAM	SVTT	- MK 50	SRBOC	NIXIE	EOD TEAM
SPS-49	X					L			D				E	D							D															
SPS-67		X				L			D				E	D							D															
TAS			X			L			D					D							D									D						
SQR-19				X													D				D															
SUTEC DOUBLE EAGLE					X																D															L
SLQ-32	L	L	L			X															D													L		
VIDEO/OPTICAL							X							D		D					D															
ACDS								X													D															
CEC	D	D	D						X												D															
JMICS										X											D															
PANTHER											X						D	E		D	D												EM			
SMALL BOATS (2)												X						E																		M
IFF	E	E											X								D															
MK 86 GFCS	D	D	D				D							X	D	D					D	D	D	D												
- SPG-60/SPQ-9														D	X						D															
IR MK-46							D							D		X					D															
SQQ-89				D							D						X				D	D										L			ML	
VOICE COMMS											E	E						X																		E
GPS																			X		D															D
TACAN											D									X																
RING INFO. NETWORK	D	D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D		X	D	D		D									D		
WCS														D			D				D	D	D							L						
ISDS														D							D	D	X		D					D				D		
127 mm GUN														D										X												
40 mm GUNS (2)																					D		D		X											
CANNISTER																										X	EM									
- HARPOON																										EM	X									
ABL																												X	EM							
- TOMAHAWK																												EM	X							
MK49 (RAM LAUNCHER)			D																			L	D							X	EM					
- RAM																														EM	X					
SVTT																	L															X	EM			
- MK 50											EM																					EM	X			
SRBOC						L															D		D											X		
NIXIE																	ML																		X	
EOD TEAM					L							M						E	D																	X
LEGEND	E=Electronic, M=Mechanical, D=Data, L=Logic																																			

Table G-3: Element Interface Matrix (Navy option 3)

COAST GUARD Option 1	SPY-1D	SPS-67	TAS	SQS-56	SH-100	SLQ-32	VIDEO/OPTICAL	ACDS	CEC	JMCIS	DOLPHIN	SMALL BOATS (4)	IFF	Mk 92 GFCS	CAS/STIR	IR MK-46	SQQ-89	Mk-309 ASWFC	VOICE COMMS	GPS	TACAN	RING INFO NET.	WCS	ISDS	76 mm GUN	CIWS	Mk 49 (RAM LNCHR	RAM	SVTT	MK 50	SRBOC	NIXIE	BUOY EQUIP	EOD TEAM
SPY-1D	X					L			D				E	D								D												
SPS-67		X				L			D				E	D								D												
TAS			X			L			D					D								D					D							
SQS-56				X													D	D				D												
SH-100					X																	D												L
SLQ-32	L	L	L			X																D									L			
VIDEO/OPTICAL							X							D		D						D												
ACDS								X														D												
CEC	D	D	D						X													D												
JMCIS										X												D												
DOLPHIN											X						D		E		D	D								M,E				
SMALL BOATS (4)												X							E															M
IFF	E	E											X									D												
MK 92 GFCS	D	D	D				D							X	D	D						D	D	D	D									
CAS/STIR														D	X							D												
IR Mk-46							D							D		X						D												
SQQ-89				D							D						X	D				D	D									L		
Mk-309 ASWFC				D													D	X				D	D					D	E					
VOICE COMMS											E	E							X															E
GPS																				X		D												
TACAN											D										X													
RING INFO. NETWORK	D	D	D	D	D	D	D	D	D	D	D		D	D	D	D	D	D		D		X	D	D		D								
WCS														D			D	D				D	X	D			L							
ISDS														D								D	D	X		D	D							
76 MM														D											X									
CIWS (1)																						D		D		X								
Mk 49 (RAM LNCHR)			D																				L	D			X	M,E						
RAM																											M,E	X						
SVTT																		D											X	M,E				
MK 50																		E											M,E	X				
SRBOC						L																									X			
NIXIE																	L															X		
BUOY EQUIP																																	X	
EOD TEAM					L							M							E															X

E=ELECTRONIC M=MECHANICAL
L=LOGIC D=DATA

Table G-4: Element Interface Matrix (Coast Guard option1)

COAST GUARD Option 2	XPAR	SPS-67	TAS	SH-100	SLQ-32	VIDEO/OPTICAL	ACDS	CEC	JMCIS	DOLPHIN	SMALL BOATS (4)	IFF	GFCS	GFCS RADAR	IR MK-46	VOICE COMMS	GPS	TACAN	RING INFO NET.	WCS	ISDS	40 mm GUNS	Mk 49 (RAM LNCHR	RAM	SRBOC	NIXIE	BUOY EQUIP	EOD TEAM
XPAR	X				L			D				E	D						D									
SPS-67		X			L			D				E	D						D									
TAS			X		L			D					D						D				D					
SH-100				X															D									
SLQ-32	L	L	L		X														D						L			L
VIDEO/OPTICAL						X							D		D				D									
ACDS							X												D									
CEC	D	D	D					X											D									
JMCIS									X										D									
DOLPHIN										X						E		D	D									
SMALL BOATS (4)											X					E												
IFF	E	E										X							D									M
GFCS	D	D	D			D							X	D	D				D	D	D							
GFCS RADAR													D	X					D									
IR Mk-46						D							D		X				D									
VOICE COMMS										E	E					X												
GPS																	X		D									E
TACAN										D								X										
RING INFO NETWORK	D	D	D	D	D	D	D	D	D	D		D	D	D	D		D		X	D	D	D						
WCS													D						D	X	D		L					
ISDS													D						D	D	X	D	D					
40 MM GUNS (2)																			D		D	X						
Mk 49 (RAM LNCHR)			D																	L	D		X	M,E				
RAM																							M,E	X				
SRBOC					L																				X			
NIXIE																										X		
BUOY EQUIP																											X	
EOD TEAM				L							M					E												X

E=ELECTRONIC M=MECHANICAL
L=LOGIC D=DATA

Table G-5: Element Interface Matrix (Coast Guard option 2)

COAST GUARD Option 3	SPS-49	SPS-67	SUTEC DOUBLE EA	SLQ-32	VIDEO/OPTICAL	ACDS	CEC	JMCIS	DOLPHIN	SMALL BOATS (3)	IFF	GFCS	GFCS RADAR	IR MK-46	VOICE COMMS	GPS	TACAN	RING INFO NET.	WCS	ISDS	40 mm GUN (1)	STINGER	SRBOC	NIXIE	BUOY EQUIP	EOD TEAM
SPS-49	X			L			D				E	D						D								
SPS-67		X		L			D				E	D						D								
SUTEC DOUBLE EAGLE			X															D								
SLQ-32	L	L		X														D					L			L
VIDEO/OPTICAL					X							D		D				D								
ACDS						X												D								
CEC	D	D					X											D								
JMCIS								X										D								
DOLPHIN									X						E		D	D								
SMALL BOATS (3)										X					E											
IFF	E	E									X							D								M
GFCS	D	D			D							X	D	D				D	D	D						
GFCS RADAR												D	X					D								
IR Mk-46					D							D		X				D								
VOICE COMMS									E	E					X							L				
GPS																X		D								E
TACAN									D								X									
RING INFO NETWORK	D	D	D	D	D	D	D	D	D		D	D	D	D		D		X	D	D	D					
WCS												D						D	X	D						
ISDS												D						D	D	X	D					
40 MM GUN (1)																		D		D	X					
STINGER										L												X				
SRBOC				L																			X			
NIXIE																								X		
BUOY EQUIP																									X	
EOD TEAM			L							M					E											X

E=ELECTRONIC M=MECHANICAL
L=LOGIC D=DATA

Table G-6: Element Interface Matrix (Coast Guard option 3)

APPENDIX H

ELEMENT VS. SHIP SUPPORT MATRICES

SUMMARY

A ship support matrix was constructed for each whole ship option to provide a basis for the type and amount of support needed from the ship to operate each Combat System suite. The Navy option 1 and Coast Guard option 1 suites are shown in this appendix due to their extensive list of high-end systems. The remaining suites can be characterized as a subset of the suites shown below:

H-1: Ship Support Matrix (Navy option 1)

H-2: Ship Support Matrix (Coast Guard option 1)

Elements	Electric power	400 Hz Electric	Chilled Water	A/C Ventilation	High Strength Structure	Fire Protection System	Ammunition loading equipm	Hydraulic Systems	HP air	LP air	Nitrogen	Salt Water Cooling	Gyro Inputs
SPY-1D	X	X	X	X						X			X
SPS-67	X	X	X	X	X					X		X	X
TAS	X	X	X	X	X					X		X	X
SQR-19	X	X		X									
SQS-56	X	X	X	X	X					X		X	X
SH-100	X		X	X									X
SLQ-32	X	X		X						X			X
VIDEO/OPTICAL	X	X		X									X
ACDS	X			X									
CEC	X			X									
JMCIS	X			X									
PANTHER	X	X			X	X	X	X	X	X			
SMALL BOATS (4)	X							X				X	
IFF	X	X		X									
MK 99	X	X	X	X									X
-SPG-62	X	X	X	X	X					X		X	X
Mk 34 GFCS	X	X	X	X									X
SPG-60/SPQ-9	X	X	X	X	X					X		X	X
IR Mk-46		X		X									X
SQQ-89	X	X		X									X
Mk-309 ASWFC	X	X		X									X
VOICE COMMS	X			X									
GPS	X												
TACAN	X			X									X
RING INFO NET.	X			X									
WCS	X			X									X
ISDS	X			X									
155 mm GUN	X	X	X		XXX	X	X	X	X	X		X	X
CIWS (2)	X	X	X		X	X							X
Mk 49 (RAM LNCHR)	X	X											X
RAM													X
VLS	X				X		X	X	X	X			X
HARPOON													X
TOMAHAWK													X
ESS													X
SM-2 MR													X
VLA													X
SVTT	X						X		X				X
MK 50						X	X		X	X			X
SRBOC	X					X							
NIXIE	X												
EOD TEAM	X								BYOA				

Table H-1: Ship Support Matrix (Navy option 1)

Elements	Electric power	400 Hz Electric	Chilled Water	A/C Ventilation	High Strength Structure	Fire Protection System	Ammunition loading equipm	Hydraulic Systems	HP air	LP air	Nitrogen	Salt Water Cooling	Gyro Inputs
SPY-1D	X	X	X	X						X			X
SPS-67	X	X	X	X	X					X		X	X
TAS	X	X	X	X	X					X		X	X
SQS-56	X	X	X	X	X					X		X	X
SH-100	X		X	X									X
SLQ-32	X	X		X						X			X
VIDEO/OPTICAL	X	X		X									X
ACDS	X			X									
CEC	X			X									
JMCIS	X			X									
DOLPHIN	X	X			X	X	X	X	X	X			
SMALL BOATS (4)	X							X				X	
IFF	X	X		X									
MK 92 GFCS	X	X	X	X						X			X
CAS/STIR	X	X	X	X	X					X	X	X	X
IR Mk-46	X	X		X									X
SQQ-89	X	X		X									X
Mk-309 ASWFC	X	X		X									X
VOICE COMMS	X			X									
GPS	X												
TACAN	X			X									X
RING INFO NET.	X			X									
WCS	X			X									X
ISDS	X			X									
76 MM	X	X	X		X	X	X	X	X	X		X	X
CIWS (1)	X	X	X		X	X							X
Mk 49 (RAM LNCHR)	X	X											X
RAM													X
SVTT	X						X		X				X
MK 50						X	X		X	X			X
SRBOC	X					X							
NIXIE	X												
BUOY HANDLING	X				X			X		X			
EOD TEAM	X								BYOA				

Table H-2: Ship Support Matrix (Coast Guard option 1)

APPENDIX I

ELECTROMAGNETIC INTERFERENCE MATRIX

SUMMARY

A table containing the operating frequencies for each element of the Combat System suite was constructed to examine areas of possible electromagnetic interference. The following tables contain the EMI matrices for each whole ship option:

Elements	I 100-150 MHz	G 150-225 MHz	P 225-390 MHz	L 390-1550 MHz	S 1.55-3.9 GHz	C 3.9-6.2 GHz	X 6.2-10.9 GHz	Ku 5.25-17.25 GH	Ka 33-36 GHz	Q 36-46 GHz	V 46-56 GHz	W 56-100 GHz
SPY-1D					X							
SPS-67							X					
TAS				X								
SQR-19												
SQS-56												
SH-100												
SLQ-32			P	P	P	P/A	P/A	P/A				
VIDEO/OPTICAL												
ACDS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
CEC	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
JMCIS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
PANTHER												
SMALL BOATS (4)												
IFF				X								
MK 99												
SPG-62							X					
Mk 34 GFCS												
SPG-60/SPQ-9							X					
IR Mk-46												
SQQ-89												
Mk-309 ASWFC												
VOICE COMMS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
GPS												
TACAN				X								
RING INFO NET.												
WCS												
ISDS												
155 mm GUN												
CIWS (2)								X				
Mk 49 (RAM LNCHR)												
RAM						X	X	X				
VLS												
HARPOON												
TOMAHAWK												
ESS												
SM-2 MR												
VLA												
SVTT												
MK 50												
SRBOC												
NIXIE												
EOD TEAM												

Legend
X - Indicates the band of the element
P - Indicates Passive operation for the SLQ-32
A - Indicates Active Jamming capabilities of the SLQ-32

Only radio frequencies are shown, no sonar or light frequencies.

Table I-1: EMI Matrix (Navy option 1)

Elements	I 100-150 MHz	G 150-225 MHz	P 225-390 MHz	L 390-1550 MHz	S 1.55-3.9 GHz	C 3.9-6.2 GHz	X 6.2-10.9 GHz	Ku 5.25-17.25 GH	Ka 33-36 GHz	Q 36-46 GHz	V 46-56 GHz	W 56-100 GHz
XPAR					X							
SPS-67							X					
ATAS												
SH-100												
SLQ-32			P	P	P	P/A	P/A	P/A				
VIDEO/OPTICAL												
ACDS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
CEC	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
JMCIS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
PANTHER												
SMALL BOATS (2)												
IFF				X								
MK 99												
SPG-62							X					
Mk 34 GFCS												
SPG-60/SPQ-9							X					
IR MK-46												
SQQ-89												
MK-116 ASWFC												
VOICE COMMS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
GPS												
TACAN				X								
RING INFO NET.												
WCS												
ISDS												
127 mm GUN												
40 mm GUNS (2)								X				
VLS												
HARPOON												
TOMAHAWK												
ESS												
SM-2 MR												
VLA												
SVTT												
MK 50												
SRBOC												
NIXIE												
EOD TEAM												

Legend
X - Indicates the band of the element
P - Indicates Passive operation for the SLQ-32
A - Indicates Active Jamming capabilities of the SLQ-32

Only radio frequencies are shown, no sonar or light frequencies.

Table I-2: EMI Matrix (Navy option 2)

	I	G	P	L	S	C	X	Ku	Ka	Q	V	W
Elements	100-150 MHz	150-225 MHz	225-390 MHz	390-1550 MHz	1.55-3.9 GHz	3.9-6.2 GHz	6.2-10.9 GHz	5.25-17.25 GH	33-36 GHz	36-46 GHz	46-56 GHz	56-100 GHz
SPS-49				X	X							
SPS-67							X					
SQR-19												
SUTEC DOUBLE EAGLE												
SLQ-32			P	P	P	P/A	P/A	P/A				
VIDEO/OPTICAL												
ACDS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
CEC	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
JMCIS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
PANTHER												
SMALL BOATS (2)												
IFF				X								
MK 86 GFCS												
SPG-60/SPQ-9							X					
IR MK-46												
SQQ-89												
VOICE COMMS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
GPS												
TACAN				X								
RING INFO NET.												
WCS												
ISDS												
127 mm GUN												
40 mm GUNS (2)								X				
CANNISTER												
HARPOON												
ABL												
TOMAHAWK												
RAM						X	X	X				
MK49 (RAM LAUNCHER)												
SVTT												
MK 50												
SRBOC												
NIXIE												
EOD TEAM												

Legend
X - Indicates the band of the element
P - Indicates Passive operation for the SLQ-32
A - Indicates Active Jamming capabilities of the SLQ-32

Only radio frequencies are shown, no sonar or light frequencies.

Table I-3: EMI Matrix (Navy option 3)

	I	G	P	L	S	C	X	Ku	Ka	Q	V	W
Elements	100-150 MHz	150-225 MHz	225-390 MHz	390-1550 MHz	1.55-3.9 GHz	3.9-6.2 GHz	6.2-10.9 GHz	5.25-17.25 GH	33-36 GHz	36-46 GHz	46-56 GHz	56-100 GHz
SPY-1D					X							
SPS-67							X					
TAS												
SQS-56												
SH-100												
SLQ-32			P	P	P	P/A	P/A	P/A				
VIDEO/OPTICAL												
ACDS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
CEC	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
JMCIS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
DOLPHIN												
SMALL BOATS (4)												
IFF				X								
MK 92 GFCS												
CAS/STIR							X					
IR Mk-46												
SQQ-89												
Mk-309 ASWFC												
VOICE COMMS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
GPS												
TACAN				X								
RING INFO NET												
WCS												
ISDS												
76 MM												
CIWS (1)								X				
Mk 49 (RAM LNCHR)												
RAM						X	X	X				
SVTT												
MK 50												
SRBOC												
NIXIE												
EOD TEAM												

Legend
X - Indicates the band of the element
P - Indicates Passive operation for the SLQ-32
A - Indicates Active Jamming capabilities of the SLQ-32

Only radio frequencies are shown, no sonar or light frequencies.

Table I-4: EMI Matrix (Coast Guard option 1)

Elements	I 100-150 MHz	G 150-225 MHz	P 225-390 MHz	L 390-1550 MHz	S 1.55-3.9 GHz	C 3.9-6.2 GHz	X 6.2-10.9 GHz	Ku 5.25-17.25 GH	Ka 33-36 GHz	Q 36-46 GHz	V 46-56 GHz	W 56-100 GHz
XPAR					X							
SPS-67							X					
TAS				X								
SH-100												
SLQ-32			P	P	P	P/A	P/A	P/A				
VIDEO/OPTICAL												
ACDS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
CEC	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
JMCIS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
DOLPHIN												
SMALL BOATS (4)												
IFF				X								
GFCS												
GFCS RADAR							X					
IR Mk-46												
VOICE COMMS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
GPS												
TACAN				X								
RING INFO NET												
WCS												
ISDS												
40 MM GUNS (2)								X				
Mk 49 (RAM LNCHR)												
RAM						X	X	X				
SRBOC												
NIXIE												
EOD TEAM												

Legend
X - Indicates the band of the element
P - Indicates Passive operation for the SLQ-32
A - Indicates Active Jamming capabilities of the SLQ-32

Only radio frequencies are shown, no sonar or light frequencies.

Table I-5: EMI Matrix (Coast Guard option 2)

	I	G	P	L	S	C	X	Ku	Ka	Q	V	W
Elements	100-150 MHz	150-225 MHz	225-390 MHz	390-1550 MHz	1.55-3.9 GHz	3.9-6.2 GHz	6.2-10.9 GHz	5.25-17.25 GH	33-36 GHz	36-46 GHz	46-56 GHz	56-100 GHz
SPS-49				X	X							
SPS-67							X					
SUTEC DOUBLE EAGLE												
SLQ-32			P	P	P	P/A	P/A	P/A				
VIDEO/OPTICAL												
ACDS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
CEC	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
JMCIS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
DOLPHIN												
SMALL BOATS (3)												
IFF				X								
GFCS												
GFCS RADAR							X					
IR Mk-46												
VOICE COMMS	VHF	VHF	VHF/UHF	UHF	UHF/SHF	SHF	SHF	SHF				
GPS												
TACAN				X								
RING INFO NET												
WCS												
ISDS												
40 MM GUN (1)								X				
STINGER												
SRBOC												
NIXIE												
EOD TEAM												

Legend
X - Indicates the band of the element
P - Indicates Passive operation for the SLQ-32
A - Indicates Active Jamming capabilities of the SLQ-32

Only radio frequencies are shown, no sonar or light frequencies.

Table I-6: EMI Matrix (Coast Guard option 3)

APPENDIX J

WARSHIP 21 DATA

SUMMARY

Warship-21 is a combatant ship design program developed by John J. McMullen Associates for NAVSEA (03D). Its intended use is directed toward feasibility studies and initial design comparisons. It is a menu-driven program that uses desired (by the user) performance and mission characteristics, empirical relationships, and known equipment characterizations to define a ship's top level characteristics (length, beam, speed, combat payload, etc.).

Enclosed in this appendix (H) are the Warship-21 reports for the various Navy version options (pp H-3 to H-12), and Coast Guard version options (H-13 to H-22). There are three options for each variant, with option 2 of each variant broken down in to three sub-options. The three sub-options were used to characterize (volume and weight) three different existing air search radars (Spy-1D, SPS-48E, and SPS-49D) as surrogates for a yet-to-be-produced, small, phased array radar (X-PAR). The option number of each report is in the upper left hand corner of each page.

The only other differences between input parameters were endurance range and speed. The Navy versions were modeled using 5,000 NM @ 20 knots. The Coast Guard versions used 8,000 NM @ 14 knots.

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 17:29:47

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 1

NAVY OPT 1
5000 NM @ 20

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	421.94 FT
LOA	456.97 FT
BEAM	46.88 FT
DRAFT TO KEEL	13.67 FT
DEPTH @ STA 10	30.00 FT
GMT	5.39 FT
GMT/BEAM RATIO	0.115
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,400
200	PROPULSION	305
300	ELECTRICAL	241
400	COMM. & SURVEIL.	145
500	*AUX SYSTEMS	547
600	OUTFIT & FURN.	261
700	*ARMAMENT	223
SUM GROUPS 1-7		3,122
WEIGHT MARGIN		3
LIGHTSHIP WEIGHT		3,125
FUEL WEIGHT		294
OTHER LOADS		150
FULL LOAD DISP.		3,569
FULL LOAD KG		19.99 FT

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	135,630
2	HUMAN SUPPORT	53,681
3	SHIP SUPPORT	148,830
4	SHIP MACHINERY	145,594
TOTAL VOLUME		483,734

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	12
CHIEFS	10
ENLISTED	84
TOTAL MANNING	106
TOTAL ACCOMMODATIONS	119

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR
NO. MAIN ENG:	1
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel
ENG. @ CRUISE:	2
INSTALLED BHP:	36,780 HP
SUST. SPEED:	26.57 KTS
SUST. SHP:	19,007 HP
CRUISE SPEED:	20.00 KTS
CRUISE SHP:	7,196 HP
RANGE:	5,000 NM

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	2,604 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	Aegis (SPY-1D)
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	SQS-56
HELICOPTER:	1 SH-60B
GUNS:	1 155mm
CIWS:	2 Phalanx
TORPEDOES:	2 Mk-32
SHORT RNG AAW:	1 21-cell RAM
NO. VLS CELLS:	32
STANDARD:	13
TOMAHAWK:	11
ASROC:	8
NIXIE:	Yes
TACTASS:	Yes

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$843.635 MIL
FOURTH SHIP COST:	$756.460 MIL
*PAYLOAD COST:	$156.593 MIL
NONRECUR. COST:	$176.335 MIL
AVERAGE COST:	$432.139 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$11.04 MIL

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 17:29:49

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 1

NAVY OPT 1
5000 NM @ 20

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
Stern Ramp	500	2.00	15.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
HARPOON 4 PK	000	4.00	40.000	2.00
HARPOON 4 PK	000	4.00	40.000	2.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
Stern Ramp	0.000	6000.00	2.00E+05
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
HARPOON 4 PK	0.000	0.00	3.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 17:23:23

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 2

NAVY OPT 2
5000 NM @ 20
SPS-49D sub for MINI SPY

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	400.83 FT
LOA	434.10 FT
BEAM	44.54 FT
DRAFT TO KEEL	12.98 FT
DEPTH @ STA 10	30.00 FT
GMT	5.52 FT
GMT/BEAM RATIO	0.124
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR	
NO. MAIN ENG:	1	
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel	
ENG. @ CRUISE:	2	
INSTALLED BHP:	36,780	HP
SUST. SPEED:	27.08	KTS
SUST. SHP:	19,007	HP
CRUISE SPEED:	20.00	KTS
CRUISE SHP:	6,592	HP
RANGE:	5,000	NM

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,219
200	PROPULSION	302
300	ELECTRICAL	234
400	COMM. & SURVEIL.	60
500	*AUX SYSTEMS	485
600	OUTFIT & FURN.	227
700	*ARMAMENT	192
SUM GROUPS 1-7		2,719
WEIGHT MARGIN		3
LIGHTSHIP WEIGHT		2,722
FUEL WEIGHT		204
OTHER LOADS		134
FULL LOAD DISP.		3,060
FULL LOAD KG		18.59 FT

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	1,535 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	SPS-49 V(5) 2D
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	1 5-inch Mk 45
CIWS:	2 Phalanx
TORPEDOES:	2 Mk-32
SHORT RNG AAW:	[None]
NO. VLS CELLS:	32
STANDARD:	13
TOMAHAWK:	11
ASROC:	8
NIXIE:	Yes
TACTASS:	Yes

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	100,464
2	HUMAN SUPPORT	45,201
3	SHIP SUPPORT	118,987
4	SHIP MACHINERY	131,758
TOTAL VOLUME		396,410

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$741.241 MIL
FOURTH SHIP COST:	$666.651 MIL
*PAYLOAD COST:	$125.093 MIL
NONRECUR. COST:	$163.266 MIL
AVERAGE COST:	$370.402 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$10.75 MIL

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	10
CHIEFS	9
ENLISTED	70
TOTAL MANNING	89
TOTAL ACCOMMODATIONS	100

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 17:23:24

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 2
NAVY OPT 2
5000 NM @ 20
SPS-49D sub for MINI SPY

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
Stern Ramp	500	2.00	15.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
HARPOON 4 PK	000	4.00	40.000	2.00
HARPOON 4 PK	000	4.00	40.000	2.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
Stern Ramp	0.000	6000.00	2.00E+05
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 17:20:56

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 2

NAVY OPT 2
5000 NM @ 20
SPS-48E sub for MINI SPY

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	409.02 FT
LOA	442.97 FT
BEAM	45.45 FT
DRAFT TO KEEL	13.25 FT
DEPTH @ STA 10	30.00 FT
GMT	5.23 FT
GMT/BEAM RATIO	0.115
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR
NO. MAIN ENG:	1
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel
ENG. @ CRUISE:	2
INSTALLED BHP:	36,780 HP
SUST. SPEED:	27.03 KTS
SUST. SHP:	19,007 HP
CRUISE SPEED:	20.00 KTS
CRUISE SHP:	6,824 HP
RANGE:	5,000 NM

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,321
200	PROPULSION	303
300	ELECTRICAL	238
400	COMM. & SURVEIL.	76
500	*AUX SYSTEMS	521
600	OUTFIT & FURN.	246
700	*ARMAMENT	193
SUM GROUPS 1-7		2,898
WEIGHT MARGIN		3
LIGHTSHIP WEIGHT		2,901
FUEL WEIGHT		208
OTHER LOADS		142
FULL LOAD DISP.		3,251
FULL LOAD KG		19.38 FT

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	1,575 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	SPS-48E 3D
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	1 5-inch Mk 45
CIWS:	2 Phalanx
TORPEDOES:	2 Mk-32
SHORT RNG AAW:	[None]
NO. VLS CELLS:	32
STANDARD:	13
TOMAHAWK:	11
ASROC:	8
NIXIE:	Yes
TACTASS:	Yes

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	127,375
2	HUMAN SUPPORT	47,618
3	SHIP SUPPORT	132,509
4	SHIP MACHINERY	139,825
TOTAL VOLUME		447,327

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$761.117 MIL
FOURTH SHIP COST:	$684.683 MIL
*PAYLOAD COST:	$125.093 MIL
NONRECUR. COST:	$168.294 MIL
AVERAGE COST:	$379.609 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$10.67 MIL

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	10
CHIEFS	10
ENLISTED	74
TOTAL MANNING	94
TOTAL ACCOMMODATIONS	105

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 17:20:58

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 2

NAVY OPT 2
5000 NM @ 20
SPS-48E sub for MINI SPY

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
Stern Ramp	500	2.00	15.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
HARPOON 4 PK	000	4.00	40.000	2.00
HARPOON 4 PK	000	4.00	40.000	2.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
Stern Ramp	0.000	6000.00	2.00E+05
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 17:17:32

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 2

NAVY OPT 2
5000 NM @ 20
SPY-1D sub for MINI SPY

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	416.87 FT
LOA	451.47 FT
BEAM	46.32 FT
DRAFT TO KEEL	13.50 FT
DEPTH @ STA 10	30.00 FT
GMT	5.55 FT
GMT/BEAM RATIO	0.120
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR
NO. MAIN ENG:	1
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel
ENG. @ CRUISE:	2
INSTALLED BHP:	36,780 HP
SUST. SPEED:	26.75 KTS
SUST. SHP:	19,007 HP
CRUISE SPEED:	20.00 KTS
CRUISE SHP:	7,048 HP
RANGE:	5,000 NM

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,357
200	PROPULSION	304
300	ELECTRICAL	239
400	COMM. & SURVEIL.	120
500	*AUX SYSTEMS	533
600	OUTFIT & FURN.	252
700	*ARMAMENT	194
	SUM GROUPS 1-7	2,999
	WEIGHT MARGIN	3
	LIGHTSHIP WEIGHT	3,002
	FUEL WEIGHT	295
	OTHER LOADS	145
	FULL LOAD DISP.	3,442
	FULL LOAD KG	19.53 FT

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	2,608 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	Aegis (SPY-1D)
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	1 5-inch Mk 45
CIWS:	2 Phalanx
TORPEDOES:	2 Mk-32
SHORT RNG AAW:	[None]
NO. VLS CELLS:	32
STANDARD:	13
TOMAHAWK:	11
ASROC:	8
NIXIE:	Yes
TACTASS:	Yes

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	128,207
2	HUMAN SUPPORT	49,334
3	SHIP SUPPORT	143,622
4	SHIP MACHINERY	142,398
	TOTAL VOLUME	463,562

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	10
CHIEFS	10
ENLISTED	78
TOTAL MANNING	98
TOTAL ACCOMMODATIONS	110

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$773.932 MIL
FOURTH SHIP COST:	$696.701 MIL
*PAYLOAD COST:	$125.093 MIL
NONRECUR. COST:	$173.161 MIL
AVERAGE COST:	$383.735 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$10.85 MIL

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 17:17:34

SHIP DATA FILE: CPCN2.SDF

SHIP DESCRIPTION: CPCX Option 2

NAVY OPT 2
5000 NM @ 20
SPY-1D sub for MINI SPY

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
Stern Ramp	500	2.00	15.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
HARPOON 4 PK	000	4.00	40.000	2.00
HARPOON 4 PK	000	4.00	40.000	2.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
Stern Ramp	0.000	6000.00	2.00E+05
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 17:12:05

SHIP DATA FILE: CPCN3.SDF

SHIP DESCRIPTION: CPCX Option 3

NAVY OPT 3
5000 NM @ 20

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	390.29 FT
LOA	422.68 FT
BEAM	43.37 FT
DRAFT TO KEEL	12.64 FT
DEPTH @ STA 10	30.00 FT
GMT	5.48 FT
GMT/BEAM RATIO	0.126
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,160
200	PROPULSION	300
300	ELECTRICAL	231
400	COMM. & SURVEIL.	55
500	*AUX SYSTEMS	465
600	OUTFIT & FURN.	215
700	*ARMAMENT	120
SUM GROUPS 1-7		2,547
WEIGHT MARGIN		3
LIGHTSHIP WEIGHT		2,549
FUEL WEIGHT		205
OTHER LOADS		70
FULL LOAD DISP.		2,825
FULL LOAD KG		17.99 FT

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	87,361
2	HUMAN SUPPORT	42,300
3	SHIP SUPPORT	111,979
4	SHIP MACHINERY	127,426
TOTAL VOLUME		369,066

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	8
CHIEFS	8
ENLISTED	69
TOTAL MANNING	85
TOTAL ACCOMMODATIONS	95

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR	
NO. MAIN ENG:	1	
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel	
ENG. @ CRUISE:	2	
INSTALLED BHP:	36,780	HP
SUST. SPEED:	27.49	KTS
SUST. SHP:	19,007	HP
CRUISE SPEED:	20.00	KTS
CRUISE SHP:	6,300	HP
RANGE:	5,000	NM

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	1,546 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	SPS-49 V(5) 2D
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	1 5-inch Mk 45
CIWS:	2 Phalanx
TORPEDOES:	2 Mk-32
SHORT RNG AAW:	1 21-cell RAM
NO. VLS CELLS:	0
STANDARD:	0
TOMAHAWK:	0
ASROC:	0
NIXIE:	Yes
TACTASS:	Yes

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$760.976 MIL
FOURTH SHIP COST:	$681.816 MIL
*PAYLOAD COST:	$146.093 MIL
NONRECUR. COST:	$156.867 MIL
AVERAGE COST:	$392.242 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$11.06 MIL

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 17:12:07

SHIP DATA FILE: CPCN3.SDF

SHIP DESCRIPTION: CPCX Option 3

NAVY OPT 3
5000 NM @ 20

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
Stern Ramp	500	2.00	15.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
HARPOON 4 PK	000	4.00	40.000	2.00
HARPOON 4 PK	000	4.00	40.000	2.00
THAWK IN ABL 4PK	000	10.00	35.000	2.00
THAWK IN ABL 4PK	000	10.00	35.000	2.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
Stern Ramp	0.000	6000.00	2.00E+05
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05
HARPOON 4 PK	0.000	0.00	3.50E+05
THAWK IN ABL 4PK	0.000	0.00	5.00E+06
THAWK IN ABL 4PK	0.000	0.00	5.00E+06

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 16:33:36

SHIP DATA FILE: CPCCG1.SDF

SHIP DESCRIPTION: CPCX Option 4

CG OPTION 1

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	424.40 FT
LOA	459.63 FT
BEAM	47.16 FT
DRAFT TO KEEL	13.75 FT
DEPTH @ STA 10	30.00 FT
GMT	7.28 FT
GMT/BEAM RATIO	0.154
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR	
NO. MAIN ENG:	1	
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel	
ENG. @ CRUISE:	2	
INSTALLED BHP:	36,780	HP
SUST. SPEED:	26.58	KTS
SUST. SHP:	19,007	HP
CRUISE SPEED:	14.00	KTS
CRUISE SHP:	2,531	HP
RANGE:	8,000	NM

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,345
200	PROPULSION	305
300	ELECTRICAL	239
400	COMM. & SURVEIL.	133
500	*AUX SYSTEMS	534
600	OUTFIT & FURN.	252
700	*ARMAMENT	54
SUM GROUPS 1-7		2,863
WEIGHT MARGIN		3
LIGHTSHIP WEIGHT		2,866
FUEL WEIGHT		680
OTHER LOADS		86
FULL LOAD DISP.		3,632
FULL LOAD KG		18.25 FT

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	2,651 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	Aegis (SPY-1D)
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	1 76mm
CIWS:	2 Phalanx
TORPEDOES:	[None]
SHORT RNG AAW:	1 21-cell RAM
NO. VLS CELLS:	0
STANDARD:	0
TOMAHAWK:	0
ASROC:	0
NIXIE:	Yes
TACTASS:	No

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	94,819
2	HUMAN SUPPORT	50,220
3	SHIP SUPPORT	173,459
4	SHIP MACHINERY	141,896
TOTAL VOLUME		460,393

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	11
CHIEFS	10
ENLISTED	78
TOTAL MANNING	99
TOTAL ACCOMMODATIONS	111

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1995
NUMBER OF SHIPS:	100
LEAD SHIP COST:	$779.260 MIL
FOURTH SHIP COST:	$702.344 MIL
*PAYLOAD COST:	$126.318 MIL
NONRECUR. COST:	$177.877 MIL
AVERAGE COST:	$382.449 MIL
LEARNING CURVE:	93.00 %
HOURS @ SEA:	3,000
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$11.12 MIL

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 16:33:38

SHIP DATA FILE: CPCCG1.SDF

CG OPTION 1

SHIP DESCRIPTION: CPCX Option 4

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

50% Manning Reduction
Bow Bulb
Fiberoptics
Fire Zones
High Speed Hull Form
IR Insulation
Lightweight Cable
Lightweight Foundations
Machinery Monitoring & Control
Modular Combat System
Orthotropic Deckhouse
Orthotropic Decks
Producible Ship
Reverse Osmosis
Stern Wedge
URN Reduction
Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Stern Ramp	500	2.00	15.000	25.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Crane	500	4.00	30.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Stern Ramp	0.000	6000.00	2.00E+05
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Crane	0.000	1500.00	7.50E+04
SH100 Minehunting Sonar	0.000	200.00	1.00E+06

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 16:52:36

SHIP DATA FILE: CPCCG2.SDF

SHIP DESCRIPTION: CPCX Option 5
COAST GUARD opt 2
sps49 sub for mini SPY

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	399.03 FT
LOA	432.14 FT
BEAM	44.34 FT
DRAFT TO KEEL	12.93 FT
DEPTH @ STA 10	30.00 FT
GMT	7.11 FT
GMT/BEAM RATIO	0.160
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR	
NO. MAIN ENG:	1	
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel	
ENG. @ CRUISE:	2	
INSTALLED BHP:	36,780	HP
SUST. SPEED:	27.15	KTS
SUST. SHP:	19,007	HP
CRUISE SPEED:	14.00	KTS
CRUISE SHP:	2,270	HP
RANGE:	8,000	NM

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,142
200	PROPULSION	302
300	ELECTRICAL	231
400	COMM. & SURVEIL.	68
500	*AUX SYSTEMS	463
600	OUTFIT & FURN.	213
700	*ARMAMENT	44
	SUM GROUPS 1-7	2,462
	WEIGHT MARGIN	2
	LIGHTSHIP WEIGHT	2,465
	FUEL WEIGHT	484
	OTHER LOADS	70
	FULL LOAD DISP.	3,019
	FULL LOAD KG	16.89 FT

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	1,615 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	SPS-49 V(5) 2D
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	[None]
CIWS:	2 Phalanx
TORPEDOES:	[None]
SHORT RNG AAW:	1 21-cell RAM
NO. VLS CELLS:	0
STANDARD:	0
TOMAHAWK:	0
ASROC:	0
NIXIE:	Yes
TACTASS:	No

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	59,619
2	HUMAN SUPPORT	43,484
3	SHIP SUPPORT	132,218
4	SHIP MACHINERY	126,236
	TOTAL VOLUME	361,557

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$689.573 MIL
FOURTH SHIP COST:	$622.654 MIL
*PAYLOAD COST:	$104.818 MIL
NONRECUR. COST:	$162.165 MIL
AVERAGE COST:	$333.126 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$10.97 MIL

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	10
CHIEFS	9
ENLISTED	66
TOTAL MANNING	85
TOTAL ACCOMMODATIONS	95

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 16:52:38

SHIP DATA FILE: CPCCG2.SDF

SHIP DESCRIPTION: CPCX Option 5
COAST GUARD opt 2
sps49 sub for mini SPY

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Stern Ramp	500	2.00	15.000	25.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Crane	500	4.00	30.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Stern Ramp	0.000	6000.00	2.00E+05
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Crane	0.000	1500.00	7.50E+04
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 17:35:20

SHIP DATA FILE: CPCCG2.SDF

SHIP DESCRIPTION: CPCX Option 5
COAST GUARD opt 2
SPS-48E sub for Mini SPY

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	407.75 FT
LOA	441.59 FT
BEAM	45.31 FT
DRAFT TO KEEL	13.21 FT
DEPTH @ STA 10	30.00 FT
GMT	6.78 FT
GMT/BEAM RATIO	0.150
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR	
NO. MAIN ENG:	1	
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel	
ENG. @ CRUISE:	2	
INSTALLED BHP:	36,780	HP
SUST. SPEED:	27.08	KTS
SUST. SHP:	19,007	HP
CRUISE SPEED:	14.00	KTS
CRUISE SHP:	2,358	HP
RANGE:	8,000	NM

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,247
200	PROPULSION	303
300	ELECTRICAL	235
400	COMM. & SURVEIL.	83
500	*AUX SYSTEMS	501
600	OUTFIT & FURN.	233
700	*ARMAMENT	45
SUM GROUPS 1-7		2,648
WEIGHT MARGIN		3
LIGHTSHIP WEIGHT		2,651
FUEL WEIGHT		493
OTHER LOADS		78
FULL LOAD DISP.		3,221
FULL LOAD KG		17.75 FT

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	1,654 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	SPS-48E 3D
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	[None]
CIWS:	2 Phalanx
TORPEDOES:	[None]
SHORT RNG AAW:	1 21-cell RAM
NO. VLS CELLS:	0
STANDARD:	0
TOMAHAWK:	0
ASROC:	0
NIXIE:	Yes
TACTASS:	No

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	86,567
2	HUMAN SUPPORT	45,901
3	SHIP SUPPORT	146,305
4	SHIP MACHINERY	134,417
TOTAL VOLUME		413,190

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$710.496 MIL
FOURTH SHIP COST:	$641.650 MIL
*PAYLOAD COST:	$104.818 MIL
NONRECUR. COST:	$167.513 MIL
AVERAGE COST:	$342.757 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$10.86 MIL

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	10
CHIEFS	10
ENLISTED	70
TOTAL MANNING	90
TOTAL ACCOMMODATIONS	101

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 17:35:22

SHIP DATA FILE: CPCCG2.SDF

SHIP DESCRIPTION: CPCX Option 5
COAST GUARD opt 2
SPS-48E sub for Mini SPY

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Stern Ramp	500	2.00	15.000	25.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Crane	500	4.00	30.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Stern Ramp	0.000	6000.00	2.00E+05
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Crane	0.000	1500.00	7.50E+04
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 16:57:19

SHIP DATA FILE: CPCCG2.SDF

SHIP DESCRIPTION: CPCX Option 5
COAST GUARD opt 2
SPY-1D sub for Mini SPY

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	422.32 FT
LOA	457.38 FT
BEAM	46.92 FT
DRAFT TO KEEL	13.68 FT
DEPTH @ STA 10	30.00 FT
GMT	7.40 FT
GMT/BEAM RATIO	0.158
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,318
200	PROPULSION	305
300	ELECTRICAL	238
400	COMM. & SURVEIL.	131
500	*AUX SYSTEMS	525
600	OUTFIT & FURN.	246
700	*ARMAMENT	46
	SUM GROUPS 1-7	2,808
	WEIGHT MARGIN	3
	LIGHTSHIP WEIGHT	2,811
	FUEL WEIGHT	684
	OTHER LOADS	83
	FULL LOAD DISP.	3,579
	FULL LOAD KG	18.01 FT

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	88,285
2	HUMAN SUPPORT	48,476
3	SHIP SUPPORT	170,216
4	SHIP MACHINERY	139,727
	TOTAL VOLUME	446,704

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	10
CHIEFS	10
ENLISTED	76
TOTAL MANNING	96
TOTAL ACCOMMODATIONS	108

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR	
NO. MAIN ENG:	1	
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel	
ENG. @ CRUISE:	2	
INSTALLED BHP:	36,780	HP
SUST. SPEED:	26.55	KTS
SUST. SHP:	19,007	HP
CRUISE SPEED:	14.00	KTS
CRUISE SHP:	2,509	HP
RANGE:	8,000	NM

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	2,675 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	Aegis (SPY-1D)
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	[None]
CIWS:	2 Phalanx
TORPEDOES:	[None]
SHORT RNG AAW:	1 21-cell RAM
NO. VLS CELLS:	0
STANDARD:	0
TOMAHAWK:	0
ASROC:	0
NIXIE:	Yes
TACTASS:	No

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$734.005 MIL
FOURTH SHIP COST:	$663.727 MIL
*PAYLOAD COST:	$104.818 MIL
NONRECUR. COST:	$176.574 MIL
AVERAGE COST:	$350.177 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$11.03 MIL

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 16:57:21

SHIP DATA FILE: CPCCG2.SDF

SHIP DESCRIPTION: CPCX Option 5
COAST GUARD opt 2
SPY-1D sub for Mini SPY

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Stern Ramp	500	2.00	15.000	25.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Crane	500	4.00	30.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Stern Ramp	0.000	6000.00	2.00E+05
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Crane	0.000	1500.00	7.50E+04
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 1 -- 09/17/95 17:00:15

SHIP DATA FILE: CPCCG3.SDF

SHIP DESCRIPTION: CPCX Option 6
CG OPTION 3

DESIGN MODE: Payload Fixed

PRINCIPAL CHARACTERISTICS

LBP	394.91 FT
LOA	427.68 FT
BEAM	43.88 FT
DRAFT TO KEEL	12.79 FT
DEPTH @ STA 10	30.00 FT
GMT	7.20 FT
GMT/BEAM RATIO	0.164
CP	0.588
CX	0.785
CB	0.462
L/B	9.000
B/T	3.430
DISP/LENGTH RATIO	48

WEIGHT SUMMARY (LT)
* INDICATES MODIFIED SWBS

100	HULL STRUCTURE	1,103
200	PROPULSION	301
300	ELECTRICAL	229
400	COMM. & SURVEIL.	64
500	*AUX SYSTEMS	449
600	OUTFIT & FURN.	204
700	*ARMAMENT	35
SUM GROUPS 1-7		2,385
WEIGHT MARGIN		2
LIGHTSHIP WEIGHT		2,387
FUEL WEIGHT		473
OTHER LOADS		65
FULL LOAD DISP.		2,926
FULL LOAD KG		16.55 FT

VOLUME SUMMARY (CUFT)
* INDICATES MODIFIED SSCS

1	MISSION SUPPORT	54,214
2	HUMAN SUPPORT	39,025
3	SHIP SUPPORT	126,613
4	SHIP MACHINERY	123,324
TOTAL VOLUME		343,176

MANNING SUMMARY
(50% MANNING REDUCTION)

OFFICERS	8
CHIEFS	7
ENLISTED	63
TOTAL MANNING	78
TOTAL ACCOMMODATIONS	87

POWER PLANT SUMMARY

MAIN ENG:	GE LM-1600 ICR
NO. MAIN ENG:	1
SEP. CRUISE ENG:	MTU 16V1163 TB83 Diesel
ENG. @ CRUISE:	2
INSTALLED BHP:	36,780 HP
SUST. SPEED:	27.31 KTS
SUST. SHP:	19,007 HP
CRUISE SPEED:	14.00 KTS
CRUISE SHP:	2,229 HP
RANGE:	8,000 NM

ELECTRIC PLANT SUMMARY
* INDICATES MODIFIED LOAD

GEN.MODEL:	501-K34
NO. GEN.:	3
INSTALLED kW:	4,500 kW
*ELECTRIC LOAD:	1,568 kW (w/Margins)

COMBAT SYSTEM SUMMARY

PRIMARY RADAR:	SPS-49 V(5) 2D
SECOND. RADAR:	[None]
COMM./CONTROL:	Medium (FFG-7)
SONAR:	[None]
HELICOPTER:	1 SH-60B
GUNS:	[None]
CIWS:	1 Phalanx
TORPEDOES:	[None]
SHORT RNG AAW:	1 21-cell RAM
NO. VLS CELLS:	0
STANDARD:	0
TOMAHAWK:	0
ASROC:	0
NIXIE:	Yes
TACTASS:	No

COST ESTIMATE SUMMARY
* INDICATES MODIFIED COST

COST YEAR:	1992
NUMBER OF SHIPS:	30
LEAD SHIP COST:	$670.937 MIL
FOURTH SHIP COST:	$606.279 MIL
*PAYLOAD COST:	$99.693 MIL
NONRECUR. COST:	$159.661 MIL
AVERAGE COST:	$322.029 MIL
LEARNING CURVE:	92.00 %
HOURS @ SEA:	2,402
HOURS IN PORT:	1,982
ANNUAL O&S COST:	$10.91 MIL

WARSHIP-21 SHIP DESIGN MODEL (VER 1.53) -- PAGE 2 -- 09/17/95 17:00:17

SHIP DATA FILE: CPCCG3.SDF

SHIP DESCRIPTION: CPCX Option 6
CG OPTION 3

DESIGN MODE: Payload Fixed

TECHNOLOGIES INCLUDED IN MODEL:

- 50% Manning Reduction
- Bow Bulb
- Fiberoptics
- Fire Zones
- High Speed Hull Form
- IR Insulation
- Lightweight Cable
- Lightweight Foundations
- Machinery Monitoring & Control
- Modular Combat System
- Orthotropic Deckhouse
- Orthotropic Decks
- Producible Ship
- Reverse Osmosis
- Stern Wedge
- URN Reduction
- Waste Heat Boilers

USER-DEFINED PAYLOAD LIST:

DESCRIPTION	SWBS	WT(LT)	KG(FT)	KW LOAD
rhib	000	2.00	20.000	0.00
rhib	000	2.00	20.000	0.00
MSB	000	2.50	30.000	0.00
MSB Davits	000	4.00	35.000	25.00
Stern Ramp	500	2.00	15.000	25.00
Crane	500	4.00	30.000	25.00
SH100 Minehunting Sonar	700	1.25	5.000	6.00
40MM CIWS ADJUSTMENTS	000	0.50	40.000	10.00

DESCRIPTION	SSCS	VOL(CUFT)	COST($1983)
rhib	0.000	2000.00	5.00E+04
rhib	0.000	2000.00	5.00E+04
MSB	0.000	2500.00	7.50E+04
MSB Davits	0.000	3000.00	1.00E+05
Stern Ramp	0.000	6000.00	2.00E+05
Crane	0.000	1500.00	7.50E+04
SH100 Minehunting Sonar	0.000	200.00	1.00E+06
40MM CIWS ADJUSTMENTS	0.000	1000.00	2.50E+05

APPENDIX K

SELF DEFENSE DATA

Summary

Self-defense capabilities of CPCX variants were evaluated against a variety of inbound missile threats. The summary of "Self-Defense Efficiencies" of each CPCX variant against respective threats was shown in table (K-1). The self-defense efficiency was defined as the product of all the individual kill probabilities for each defensive system used in particular engagement. Individual defensive system kill probabilities were provided by the faculty and were also shown in table (K-2). Self-defense efficiencies were determined for individual as well as combined inbound threat missiles, using threat scenarios described in the Operational Requirements Document.

The model used to determine self-defense efficiencies was the "Engagement Sequence Diagram", an example of which was shown on page (K-5). The self-defense engagement model incorporated delays that occur due to human decision making such as reaction and evaluation times. Incorporation of actual operational doctrine the ship might use in detecting and engaging threats of a particular scenario was beyond the scope of this design project.

A summary of the number of self-defense weapons expended against various threats was shown in table (K-3). Characteristics of threat missiles A-1, A-2, etc. were identical to those shown in Appendix E.

Engagement Sequence Diagram Description

A description of the Engagement Sequence Diagram shown on page (K-5), used to depict a CPCX Navy 1 Variant defense against a single inbound sea skimming A-3 missile, is as follows:

1. The plot has axes of the inbound missile's time to impact vs. range from ship. The diagonal line from the upper left to lower right represents the range at any time after launch of the inbound missile, in this case the A-3, traveling at mach 0.9.

2. The inbound A-3 missile is detected at a range of 25 km, based on information found in Appendix E - Radar Calculations.

3. After a ten-second reaction time, the first self-defense anti-missile weapon in the Navy 1 Variant's arsenal, an Enhanced Sea Sparrow is fired. The slope of the solid line labeled "ESS" represents the Sea Sparrow's outbound speed. The Sea Sparrow's projected impact with the A-3 is represented by point "1".

4. After ten seconds of evaluation time, the second self-defense weapon, a Rolling Air Frame (RAM) missile, is fired. The projected impact point of this missile is represented by point "2".

5. In a similar manner, after an evaluation time, the second RAM is fired with projected impact point "3".

6. The self-defense efficiency of this engagement is therefore the product of individual kill probabilities for each defensive system used, as shown in the following equation. The CIWS point defense and Chaff decoy systems' kill probabilities were

included also.

$$\begin{aligned} P_k &= 1-(1-0.7)(1-0.7)(1-0.7)(1-0.5)(1-0.4) \\ &= 0.992 \end{aligned}$$

This self-defense efficiency was entered in table (K-1) for variant “Navy 1” and single missile threat “A-3”.

7. The numbers of self-defense weapons expended for this engagement (one ESS, two RAM, CIWS, and CHAFF) were entered in the appropriate blocks in table (K-3).

ENGAGEMENT SEQUENCE DIAGRAM

NAVY VARIANT 1 - MISSILE A-3

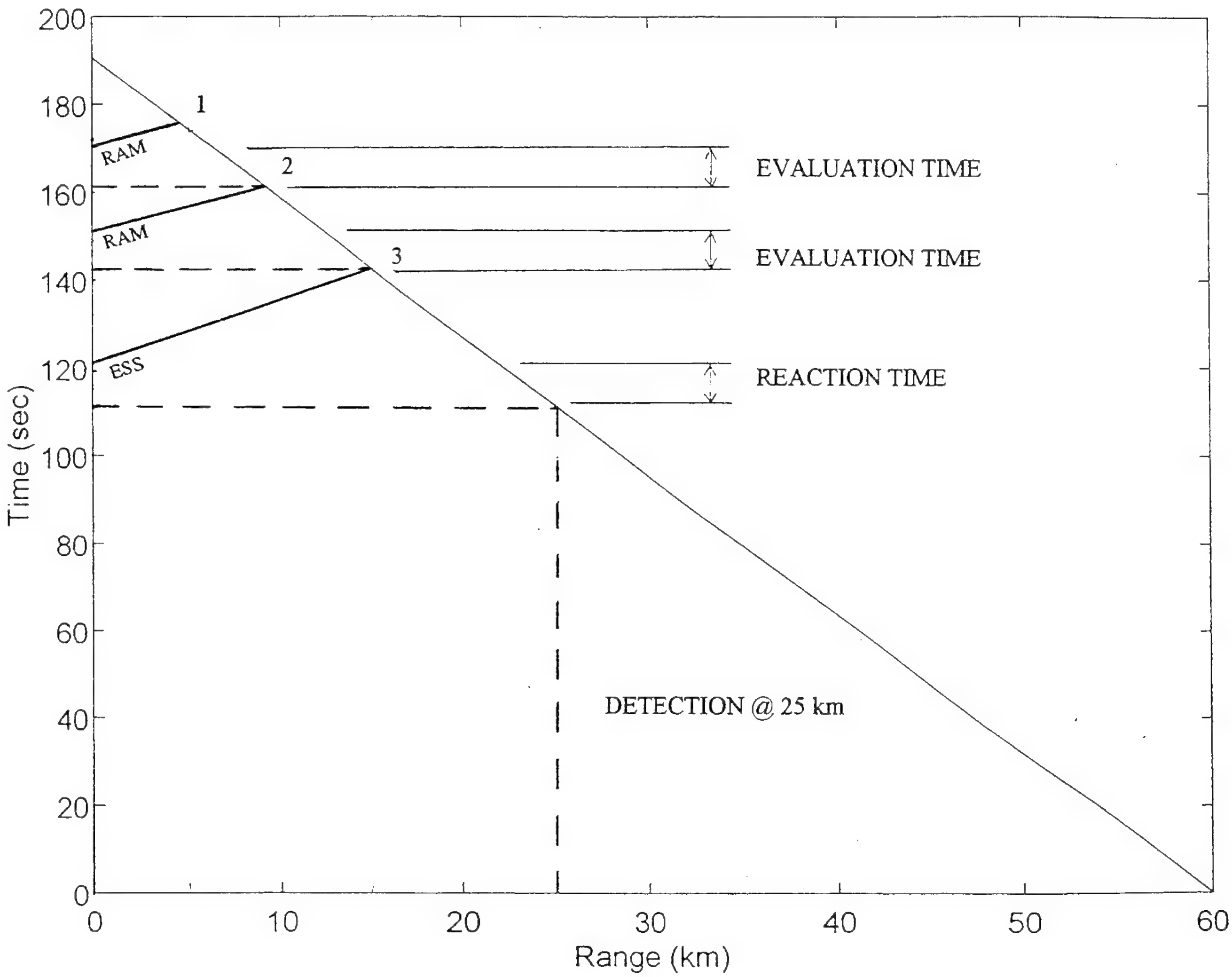


Table K-1: Self-Defense Efficiencies

		VARIANT			
	NAVY	NAVY	NAVY	CG	CG	CG
SINGLE MISSILE THREAT	1	2	3	1	2	3
A-1	0.996	0.997	0.989	0.989	0.989	0.874
A-2	0.986	0.952	0.700	0.973	0.973	0.910
A-3	0.992	0.992	0.992	0.992	0.992	0.910
A-4	0.998	0.998	0.998	0.995	0.998	0.998
M-2	0.995	0.995	0.943	0.943	0.943	0.881
COMBINED MISSILE THREAT						
THREE A-3'S						
(similar bearings)	0.993	0.993	0.987			
TWO A-3'S and ONE A-1						
(different bearings)	0.991	0.992	0.936			

Table K-2: Individual Defensive System Kill Probabilities (provided by faculty)

Defensive Missile System	**A-1**	**A-2**	**A-3**	**A-4**	**M-1**	**M-2**
SM2-MR	0.6	0.8	0.7	0.7		0.7
ESS	0.6	0.8	0.7	0.7		0.7
RAM	0.7	0.7	0.7	0.7	0.7	0.7
STINGER	0.7	0.7	0.7	0.7	0.7	0.7
CIWS/40 MM GUN	0.3	0.5	0.5	0.5	0.2	0.3
SLQ-32/CHAFF/DECOYS	0.4	0.4	0.4	0.4	0.3	0.1

Table K-3: Self-Defense Weapons Expended Against Various Threats

			SINGLE A-1 MISSILE				
SHIP OPTION	**SM2**	**ESS**	**RAM**	**STINGER**	**CIWS**	**40MM**	**CHAFF**
NAVY 1	2	2	0	0	X		X
NAVY 2	2	1	1	0		X	X
NAVY 3	0	0	3	0		X	X
CG 1	0	0	3	0	X		X
CG 2	0	0	3	0		X	X
CG 3	0	0	0	1		X	X

			SINGLE A-2 MISSILE				
SHIP OPTION	**SM2**	**ESS**	**RAM**	**STINGER**	**CIWS**	**40MM**	**CHAFF**
NAVY 1	0	2	0	0	X		X
NAVY 2	0	2	1	0		X	X
NAVY 3	0	0	0	0		X	X
CG 1	0	0	2	0	X		X
CG 2	0	0	2	0		X	X
CG 3	0	0	0	2		X	X

			SINGLE A-3 MISSILE				
SHIP OPTION	**SM2**	**ESS**	**RAM**	**STINGER**	**CIWS**	**40MM**	**CHAFF**
NAVY 1	0	1	2	0	X		X
NAVY 2	0	0	0	0		X	X
NAVY 3	0	0	3	0		X	X
CG 1	0	0	3	0	X		X
CG 2	0	0	3	0		X	X
CG 3	0	0	0	2		X	X

			SINGLE A-4 MISSILE				
SHIP OPTION	**SM2**	**ESS**	**RAM**	**STINGER**	**CIWS**	**40MM**	**CHAFF**
NAVY 1	1	3	0	0	X		X
NAVY 2	1	3	0	0		X	X
NAVY 3	0	0	4	0		X	X
CG 1	0	0	4	0	X		X
CG 2	0	0	4	0		X	X
CG 3	0	0	0	2		X	X

			SINGLE M-2 MISSILE				
SHIP OPTION	**SM2**	**ESS**	**RAM**	**STINGER**	**CIWS**	**40MM**	**CHAFF**
NAVY 1	2	2	0	0	X		X
NAVY 2	2	2	0	0		X	X
NAVY 3	0	0	2	0		X	X
CG 1	0	0	2	0	X		X
CG 2	0	0	2	0		X	X
CG 3	0	0	0	2		X	X

		THREE A-3 MISSILES ON SIMILIAR BEARINGS					
SHIP OPTION	**SM2**	**ESS**	**RAM**	**STINGER**	**CIWS**	**40MM**	**CHAFF**
NAVY 1	2	2	2	0	X		X
NAVY 2	2	2	2	0		X	X
NAVY 3	0	0	3	0		X	X
CG 1							
CG 2							
CG 3							

		TWO A-3'S, ONE A-1 MISSILE ON DIFFERENT BEARINGS					
SHIP OPTION	**SM2**	**ESS**	**RAM**	**STINGER**	**CIWS**	**40MM**	**CHAFF**
NAVY 1	2	5	5	0	X		X
NAVY 2	2	10	0	0		X	X
NAVY 3	0	0	9	0		X	X
CG 1							
CG 2							
CG 3							

APPENDIX L

MEASURES OF EFFECTIVENESS

SUMMARY

The measures of effectiveness were equated to show the relationship between each whole ship option in several designated mission areas. A weighing factor was then used to show the relative importance of each mission area and the overall MOE was determined. The following tables show the MOE calculations for each whole ship option.

Table L-1: Navy Variant MOE Calculations

Table L-2: Coast Guard MOE Calculations

	USN Variant		
	Option 1	**Option 2**	**Option 3**
Number of strike missles =	9	9	4
Range of missle (km) =	2500	2500	2500
Ability to target =	0.95	0.95	0.95
Circle error probability (m) =	5	5	5
Ship cost (M$) =	430	380	340
Number of missles needed for kill =	1	1	1
Strike effectiveness =	0.994186	1.125	0.558824
Defense efficiency =	0.992	0.992	0.992
Probability of kill given hit for ship =	0.4	0.4	0.4
Number of air self defense missles =	46	25	21
Air engagement effectiveness =	0.198326	0.242105	0.274353
Number of ASROC =	4	4	0
Range of ASROC (m) =	10000	10000	
Number of SVTT =	6	6	6
Range of SVTT (m) =	2000	2000	2000
Effectiveness of torpedo (MK50) =	0.7	0.7	0.7
Sub-surface engagement effec. =	0.846512	0.957895	0.247059
Number of guns =	1	1	1
Range of gun fire (m) =	30000	26000	26000
Weight of round (kg) =	4.7	3.5	3.5
Number of rounds =	280	400	400
Circle error probability (m) =	120	100	100
NGFS effectiveness =	0.765116	0.957895	1.070588
Search width - ship (nm) =	35	25	15
Velocity - ship (knots) =	14	14	14
Time of search - ship (hrs) =	24	24	24
Search area - ship (sq-nm) =	10000	10000	10000
Search width - helo (nm) =	50	50	50
Velocity - helo (knots) =	100	100	100
Time of search - helo (hrs) =	4	4	4
Search area - helo (sq-nm) =	10000	10000	10000
Patrol area effectiveness =	0.160812	0.14955	0.116438

Table L-1: Navy Variant MOE Calculations

Conversion factor 1 =	0.75	0.75	0.75
Conversion factor 2 =	0.75	0.75	0.75
Conversion factor 3 =	1	0.75	0.75
Conversion factor 4 =	0.25	0.25	0.25
Conversion factor 5 =	0.75	0.75	0.75
Conversion factor 6 =	0.25	0.25	0.25
Convertability effectiveness =	0.263672	0.197754	0.197754
Displacement (LT) =	4000	3600	3200
Stack exhaust temp. (C) =	150	150	150
Machinery plant noise (dB) =	155	155	155
Ship signature effectiveness =	0.250063	0.314406	0.395319
Numbr of boarding parties =	2	2	2
Number of boats =	2	2	2
Availability of boats =	0.9	0.9	0.9
Boarding effectiveness =	0.837209	0.947368	1.058824
Strike weighting factor =	1	1	1
Air engagement weighting factor =	1	1	1
Sub-surface weighting factor =	1	1	1
NGFS weighting factor =	1	1	1
Patrol area weighting factor =	0.8	0.8	0.8
Convertability weighting factor =	0.4	0.4	0.4
Ship signature weighting factor =	1	1	1
Boarding weighting factor =	0.5	0.5	0.5
Overall variant effectiveness =	5.566236	6.163862	5.233905

Table L-1: Navy Variant MOE Calculations

	USCG Variant		
	Option 1	Option 2	Option 3
Ship cost (M$) =	380	340	320
Defense efficiency =	0.992	0.992	0.91
Probability of kill given hit for ship =	0.4	0.4	0.4
Number of air self defense missles =	21	21	4
Air engagement effectiveness =	0.245474	0.274353	0.2675
Search width - ship (nm) =	30	25	20
Velocity - ship (knots) =	14	14	14
Time of search - ship (hrs) =	24	24	24
Search area - ship (sq-nm) =	10000	10000	10000
Search width - helo (nm) =	50	50	50
Velocity - helo (knots) =	100	100	100
Time of search - helo (hrs) =	4	4	4
Search area - helo (sq-nm) =	10000	10000	10000
Patrol area effectiveness =	0.167119	0.167144	0.152911
Conversion factor 1 =	0.75	0.75	0.75
Conversion factor 2 =	0.75	0.75	0.75
Conversion factor 3 =	1	0.75	0.75
Conversion factor 4 =	0.25	0.25	0.25
Conversion factor 5 =	0.75	0.75	0.75
Conversion factor 6 =	0.25	0.25	0.25
Convertability effectiveness =	0.263672	0.197754	0.197754
Displacement (LT) =	3500	3200	3000
Stack exhaust temp. (C) =	150	150	150
Machinery plant noise (dB) =	155	155	155
Ship signature effectiveness =	0.323389	0.395319	0.448029
Number of boarding parties =	2	2	2
Number of boats =	4	4	3
Availability of boats =	0.9	0.9	0.9
Boarding effectiveness =	1.894737	2.117647	1.6875
Air engagement weighting factor =	1	1	1
Patrol area weighting factor =	1	1	1
Convertability weighting factor =	1	1	1
Ship signature weighting factor =	0.5	0.5	0.5
Boarding weighting factor =	1	1	1
Overall variant effectiveness =	4.173298	4.216945	3.961856

Table L-2: Coast Guard Variant MOE Calculations

APPENDIX M

TANK DATA

SUMMARY

The software tool used to design the tanks, their geometries, and model their contents, was General Hydrostatics (GHS), by Creative Systems. GHS's Tank Maker module is a user-driven tank modeler. It uses coordinate (top, bottom, forward end, aft end, width) data input by the user, along with appropriate characteristics (contents, permeability, hull fitting) to specify where in the hull the tank is, how much it holds (volume) and how much the contents weigh. Tank Maker also computes soundings for the tanks, allowing the user to calculate the stability (from within the parent program, GHS) for various tank loads.

Several inherent inaccuracies are present in the model at this time. These are due to lack of sufficient detail in the actual hull structure, for computing tank boundaries and permeabilities. The values used were estimated based on information at time of modeling (offsets for hull, and bulkhead locations). A more detailed analysis based on the detailed design of the hull structure is required and is the next logical step in the tank modeling.

Page M-3 contains a summary of the various tanks and their capacities for both versions (Navy and Coast Guard) of the CPCX.

Page M-4 is a graphical representation of the Navy version tanks.

Page M-5 lists the longitudinal location of each tank (Navy), relative to the forward perpendicular.

Page M-6 is a graphical representation of the Coast Guard version tanks.

Page M-7 lists the longitudinal location of each tank (Coast Guard), relative to the forward perpendicular.

Navy and Coast Guard Tanks

DFM Tankage	Percent Capacity 95%	100%
2.S	1227	1292
2.P	1227	1292
3.S	2198	2314
3.P	2198	2314
5.S	2743	2887
5.P	2743	2887
6I.S	5951	6264
6I.P	5951	6264
6.S	614	646
6.P	614	646
7.S	2692	2834
7.P	2692	2834
7I.S	9545	10047
7I.P	9545	10047
8.S	3355	3532
8.P	3355	3532
8I.S	8301	8738
8I.P	8301	8738
10.S	1565	1647
10.P	1565	1647
10I.S	7090	7463
10I.P	7090	7463
12.S	13074	13762
12.P	13074	13762
13.S	10034	10562
13.P	10034	10562
Total Tankage	136,777 Gal	143,976 Gal
Wgt of fuel	443.26 Lton	466.59 Lton

Coast Guard added tanks		
14.C	4821	5075
15.S	4821	5075
15.P	4821	5075
16.S	4821	5075
16.P	4821	5075
17.C	9256	9743
18.C	3863	4066
Total Tankage	174,001 Gal	183,160 Gal
Wgt of fuel	563.9 Lton	593.58 Lton

Ballast Water (Peak Tank)	Percent Capacity 95%	100%
1.C	2121	2233
Total Tankage	2121 Gal	2233 Gal
Wgt of ballast water	8.10 Lton	8.53 Lton

LUBE OIL	Percent Capacity 95%	100%
5.C	2654	2794
Total Tankage	2,654 Gal	2,794 Gal
Wgt of lube oil	9.14 Lton	9.62 Lton

POTABLE WATER	Percent Capacity 95%	100%
4.S	3133	3298
4.P	3133	3298
Total Tankage	6,266 Gal	6,596 Gal
Wgt of potable water	23.35 Lton	24.58 Lton

WASTE OIL	Percent Capacity 95%	100%
11.C	3014	3173
Total Tankage	3,014 Gal	3,173 Gal
Wgt of waste oil	10.67 Lton	11.23 Lton

JP-5 AVIATION FUEL	Percent Capacity 95%	100%
9I.S	8123	8550
9I.S	8123	8550
9.S	3077	3239
9.P	3077	3239
Total Tankage	22,399 Gal	23,578 Gal
Wgt of JP-5	67.77 Lton	71.34 Lton

TANK SUMMARY

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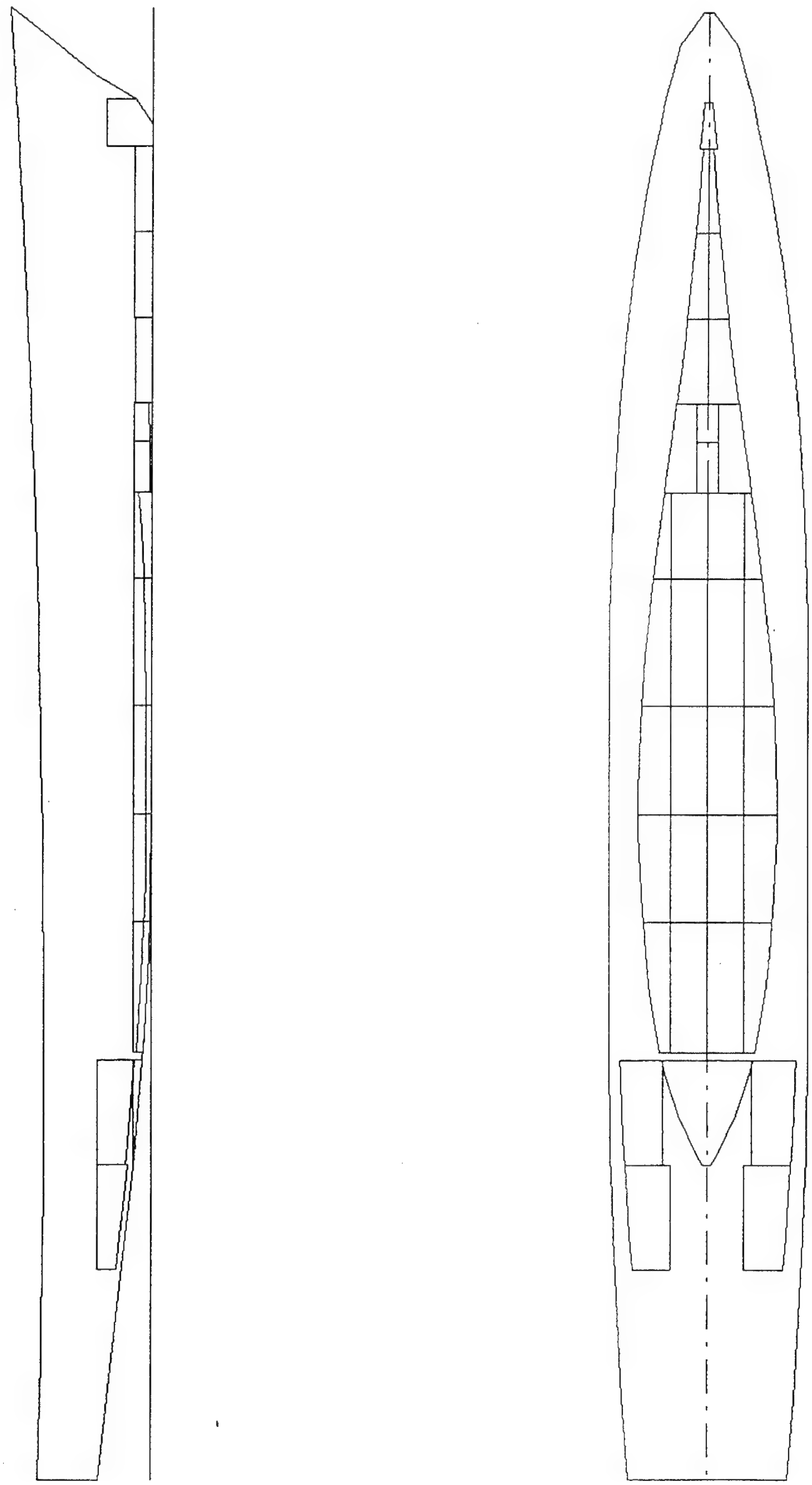
GHS-GHS/PM 2.18 CPCX



Scale = 1:550

Comments

Offsets derived from SHCP data.

Part Name	Class	Description	Location	Volume
HULL	HULL		18.36f to 380.00a	
TANK1.C	TANK		6.50a to 18.80a	298.500
TANK2.S	TANK		18.80a to 42.50a	172.666
TANK2.P	TANK		18.80a to 42.50a	172.666
TANK3.S	TANK		42.50a to 65.50a	309.295
TANK3.P	TANK		42.50a to 65.50a	309.295
TANK5.S	TANK		88.50a to 112.10a	385.975
TANK5.P	TANK		88.50a to 112.10a	385.975
TANK5.C	TANK		98.50a to 112.10a	373.464
TANK7.S	TANK		135.70a to 170.24a	378.919
TANK7.P	TANK		135.70a to 170.24a	378.919
TANK7I.S	TANK		135.70a to 170.24a	1343.13
TANK7I.P	TANK		135.70a to 170.24a	1343.13
TANK8.S	TANK		170.24a to 199.40a	472.232
TANK8.P	TANK		170.24a to 199.40a	472.232
TANK8I.S	TANK		170.24a to 199.40a	1168.17
TANK8I.P	TANK		170.24a to 199.40a	1168.17
TANK10.S	TANK		228.90a to 264.32a	220.209
TANK10.P	TANK		228.90a to 264.32a	220.209
TANK10I.S	TANK		228.90a to 264.32a	997.696
TANK10I.P	TANK		228.90a to 264.32a	997.696
TANK4.S	TANK		65.50a to 88.50a	440.828
TANK4.P	TANK		65.50a to 88.50a	440.828
TANK6I.S	TANK		112.10a to 135.70a	837.379
TANK6I.P	TANK		112.10a to 135.70a	837.379
TANK6.S	TANK		112.10a to 135.70a	86.364
TANK6.P	TANK		112.10a to 135.70a	86.364
TANK11.C	TANK		266.32a to 294.50a	424.105
TANK12.S	TANK		266.32a to 294.50a	1839.76
TANK12.P	TANK		266.32a to 294.50a	1839.76
TANK13.S	TANK		294.50a to 323.30a	1411.90
TANK9I.S	TANK		199.40a to 228.90a	1143.06
TANK9I.P	TANK		199.40a to 228.90a	1143.06
TANK9.S	TANK		199.40a to 228.90a	432.944
TANK9.P	TANK		199.40a to 228.90a	432.944
TANK13.P	TANK		294.50a to 323.30a	1411.90

Locations in Feet fwd/aft of the origin. Volumes in cubic Feet.

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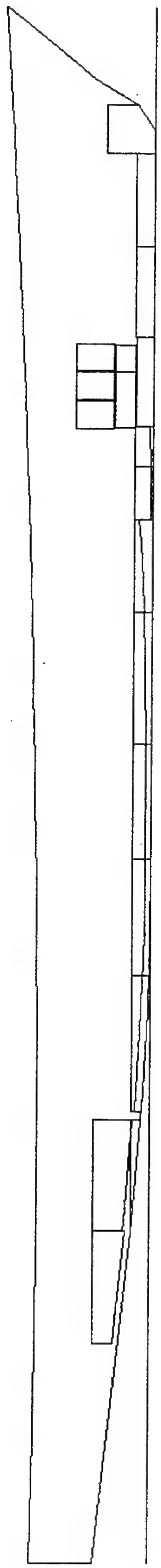
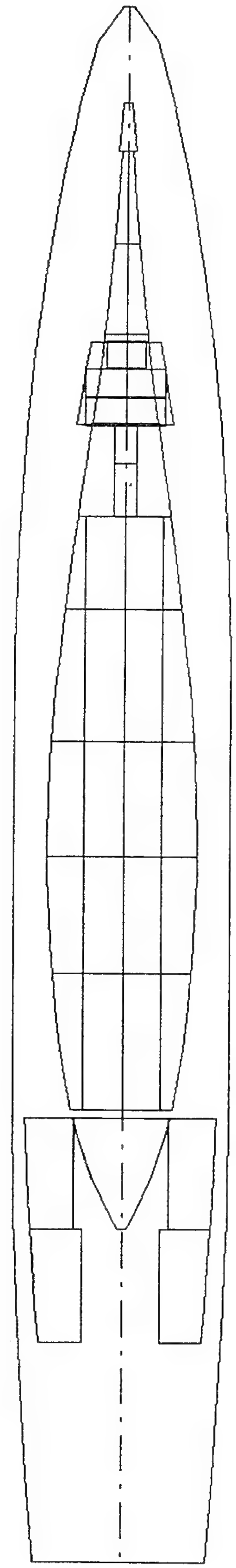
GHS-GHS/PM 2.18

CPCX COAST GUARD





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Comments

Offsets derived from SHCP data.

Part Name	Class	Description	Location	Volume
HULL	HULL		18.36f to 380.00a	
TANK1.C	TANK		6.50a to 18.80a	298.500
TANK2.S	TANK		18.80a to 42.50a	172.666
TANK2.P	TANK		18.80a to 42.50a	172.666
TANK3.S	TANK		42.50a to 65.50a	309.295
TANK3.P	TANK		42.50a to 65.50a	309.295
TANK5.S	TANK		88.50a to 112.10a	385.975
TANK5.P	TANK		88.50a to 112.10a	385.975
TANK5.C	TANK		98.50a to 112.10a	373.464
TANK7.S	TANK		135.70a to 170.24a	378.919
TANK7.P	TANK		135.70a to 170.24a	378.919
TANK7I.S	TANK		135.70a to 170.24a	1343.13
TANK7I.P	TANK		135.70a to 170.24a	1343.13
TANK8.S	TANK		170.24a to 199.40a	472.232
TANK8.P	TANK		170.24a to 199.40a	472.232
TANK8I.S	TANK		170.24a to 199.40a	1168.17
TANK8I.P	TANK		170.24a to 199.40a	1168.17
TANK10.S	TANK		228.90a to 264.32a	220.209
TANK10.P	TANK		228.90a to 264.32a	220.209
TANK10I.S	TANK		228.90a to 264.32a	997.696
TANK10I.P	TANK		228.90a to 264.32a	997.696
TANK4.S	TANK		65.50a to 88.50a	440.828
TANK4.P	TANK		65.50a to 88.50a	440.828
TANK6I.S	TANK		112.10a to 135.70a	837.379
TANK6I.P	TANK		112.10a to 135.70a	837.379
TANK6.S	TANK		112.10a to 135.70a	86.364
TANK6.P	TANK		112.10a to 135.70a	86.364
TANK11.C	TANK		266.32a to 294.50a	424.105
TANK12.S	TANK		266.32a to 294.50a	1839.76
TANK12.P	TANK		266.32a to 294.50a	1839.76
TANK13.S	TANK		294.50a to 323.30a	1411.90
TANK9I.S	TANK		199.40a to 228.90a	1143.06
TANK9I.P	TANK		199.40a to 228.90a	1143.06
TANK9.S	TANK		199.40a to 228.90a	432.944
TANK9.P	TANK		199.40a to 228.90a	432.944
TANK13.P	TANK		294.50a to 323.30a	1411.90
TANK14.C	TANK		67.50a to 74.60a	677.808
TANK15.S	TANK		74.70a to 81.80a	678.487
TANK15.P	TANK		74.70a to 81.80a	678.487
TANK16.S	TANK		82.00a to 89.10a	678.487
TANK16.P	TANK		82.00a to 89.10a	678.487
TANK17.C	TANK		74.80a to 89.00a	1302.49
TANK18.C	TANK		67.70a to 74.80a	543.529

Locations in Feet fwd/aft of the origin. Volumes in cubic Feet.

APPENDIX N

ASSET PRINTED REPORTS

SUMMARY

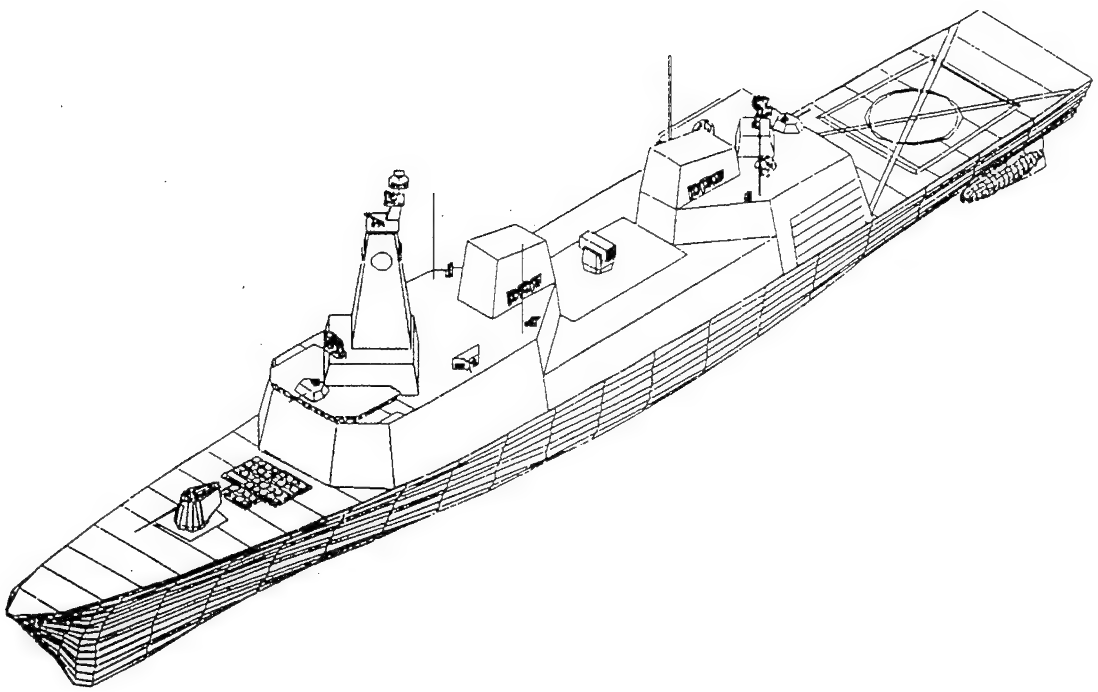
ASSET is a family of interactive computer programs developed by Boeing Computer Services, for use in the exploratory and feasibility design phases of Navy surface ships. A distinct program exists for each of several ship types, including monohull surface combatants, small waterplane area twin hull (SWATH) ships, and hydrofoils. Each program features design synthesis capability, database management, and extensive input/output options including interactive graphics and use of either English or metric units.

CPCX was designed using the monohull surface combatant program.

ASSET works in a logical fashion. It starts with an initialization section, which is followed by the synthesis section (hull (and superstructure) design, resistance, machinery, weight and space). If convergence is not achieved, the synthesis section iterates upon itself until convergence is achieved. Synthesis is followed by the analysis section which includes: performance, hydrostatics, seakeeping, manning and cost.

Two ASSET design reports are contained in this appendix (N). The first is for the selected Navy version, the second is the selected Coast Guard version. While these printed reports describe the ship in fairly high detail, it should be noted that they represent a preliminary design, not a detailed design.

NAVY VERSION
ASSET PRINTED REPORT



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ADVANCED SURFACE SHIP EVALUATION TOOL (ASSET)
 MONOHULL SURFACE COMBATANT PROGRAM (MONOSC)
 VERSION 3.3+          DATED OCTOBER 3, 1994


    ASSET/MONOSC VERSION 3.3+ - HULL GEOM MODULE - 2/11/95  10.45.20.

 PRINTED REPORT NO.  1 - HULL GEOMETRY SUMMARY

 HULL OFFSETS IND-GENERATE              MIN BEAM, FT                 36.00
 HULL DIM IND-B+T                       MAX BEAM, FT                 51.00
 MARGIN LINE IND-CALC                   HULL FLARE ANGLE, DEG         7.00
 HULL STA IND-OPTIMUM                   FORWARD BULWARK, FT           0.00
 HULL BC IND-CONV DD

                  HULL PRINCIPAL DIMENSIONS (ON DWL)
                  ==================================
 LBP, FT                       380.00   PRISMATIC COEF               0.570
 LOA, FT                       398.36   MAX SECTION COEF             0.795
 BEAM, FT                       51.00   WATERPLANE COEF              0.730
 BEAM @ WEATHER DECK, FT        54.56   LCB/LCP                      0.515
 DRAFT, FT                      15.50   HALF SIDING WIDTH, FT         1.00

 DEPTH STA 0, FT                37.60   BOT RAKE, FT                  0.00
 DEPTH STA 3, FT                34.42   RAISED DECK HT, FT            0.00
 DEPTH STA 10, FT               30.00   RAISED DECK FWD LIM, STA
 DEPTH STA 20, FT               30.76   RAISED DECK AFT LIM, STA
 FREEBOARD @ STA 3, FT          18.92   BARE HULL DISPL, LTON      3890.30

 STABILITY BEAM, FT             50.23   AREA BEAM, FT                52.51

       BARE HULL DATA ON LWL                  STABILITY DATA ON LWL
       =====================                  =====================
 LGTH ON WL, FT                380.00   KB, FT                        9.54
 BEAM, FT                       51.00   BMT,  FT                     16.42
 DRAFT, FT                      15.50   KG,  FT                      19.74
 FREEBOARD @ STA 3, FT          18.92   FREE SURF COR, FT             0.10
 PRISMATIC COEF                 0.570   SERV LIFE KG ALW, FT          0.50
 MAX SECTION COEF               0.795
 WATERPLANE COEF                0.734   GMT, FT                       5.62
 WATERPLANE AREA, FT2        14229.80   GML, FT                     827.27
 WETTED SURFACE, FT2         19071.06   GMT/B AVAIL                  0.110
                                        GMT/B REQ                    0.100
 BARE HULL DISPL, LTON        3892.53
 APPENDAGE DISPL, LTON          87.58
 FULL LOAD WT, LTON           3980.10

 PRINTED REPORT NO. 2 - HULL OFFSETS

 STATION NO.  1, AT X = -18.356 FT           STATION NO.  2, AT X =  -9.178 FT
   POINT   HALF BEAM,FT    WATERLINE,FT        POINT   HALF BEAM,FT    WATERLINE,FT
     1         0.000          38.503             1         0.000          26.708
     2         0.328          38.561             2         1.196          29.566
     3         0.762          38.620             3         3.299          32.424
     4         1.203          38.678             4         5.765          35.282
     5         1.424          38.736             5         7.922          38.140

STATION NO.  3, AT X =   0.000 FT
   POINT   HALF BEAM,FT    WATERLINE,FT
     1         0.128          15.503
     2         1.445          21.018
     3         3.869          26.534
     4         6.994          32.049
     5        10.413          37.564
```

STATION NO. 4, AT X = 6.504 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.000	4.541
2	0.005	4.552
3	0.049	4.628
4	0.171	4.837
5	0.378	5.242
6	0.628	5.911
7	0.840	6.909
8	0.932	8.301
9	0.897	10.153
10	0.858	12.532
11	1.116	15.503
12	2.639	20.919
13	5.164	26.335
14	8.373	31.752
15	11.949	37.168

STATION NO. 5, AT X = 13.009 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.000	0.000
2	0.018	0.016
3	0.099	0.124
4	0.243	0.419
5	0.443	0.992
6	0.670	1.938
7	0.878	3.349
8	1.038	5.318
9	1.181	7.938
10	1.448	11.302
11	2.123	15.503
12	3.821	20.823
13	6.430	26.142
14	9.704	31.461
15	13.397	36.781

STATION NO. 6, AT X = 32.133 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.753	0.000
2	0.779	0.016
3	0.889	0.124
4	1.072	0.419
5	1.328	0.992
6	1.654	1.938
7	2.052	3.349
8	2.534	5.318
9	3.146	7.938
10	3.987	11.302
11	5.226	15.503
12	7.269	20.552
13	10.023	25.602
14	13.364	30.651
15	17.163	35.700

STATION NO. 7, AT X = 51.257 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.039	0.016
3	1.213	0.124
4	1.531	0.419
5	2.007	0.992
6	2.652	1.938
7	3.463	3.349
8	4.434	5.318
9	5.570	7.938
10	6.907	11.302
11	8.517	15.503
12	10.681	20.303
13	13.425	25.103
14	16.647	29.904
15	20.243	34.704

STATION NO. 8, AT X = 70.381 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.059	0.016
3	1.336	0.124
4	1.870	0.419
5	2.697	0.992
6	3.819	1.938
7	5.189	3.349
8	6.732	5.318
9	8.376	7.938
10	10.085	11.302
11	11.871	15.503
12	13.971	20.075
13	16.563	24.647
14	19.514	29.219
15	22.692	33.792

STATION NO. 9, AT X = 89.505 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.089	0.016
3	1.511	0.124
4	2.328	0.419
5	3.583	0.992
6	5.254	1.938
7	7.226	3.349
8	9.326	5.318
9	11.391	7.938
10	13.324	11.302
11	15.116	15.503
12	17.016	19.868
13	19.338	24.233
14	21.912	28.599
15	24.567	32.964

STATION NO. 10, AT X = 108.629 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.135	0.016
3	1.757	0.124
4	2.923	0.419
5	4.665	0.992
6	6.918	1.938
7	9.479	3.349
8	12.066	5.318
9	14.427	7.938
10	16.424	11.302
11	18.079	15.503
12	19.698	19.682
13	21.674	23.862
14	23.814	28.041
15	25.923	32.220

STATION NO. 11, AT X = 127.753 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.198	0.016
3	2.074	0.124
4	3.637	0.419
5	5.885	0.992
6	8.694	1.938
7	11.772	3.349
8	14.737	5.318
9	17.259	7.938
10	19.190	11.302
11	20.621	15.503
12	21.929	19.518
13	23.526	23.532
14	25.219	27.547
15	26.816	31.561

STATION NO. 12, AT X = 146.878 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.264	0.016
3	2.397	0.124
4	4.346	0.419
5	7.060	0.992
6	10.356	1.938
7	13.859	3.349
8	17.098	5.318
9	19.685	7.938
10	21.477	11.302
11	22.653	15.503
12	23.661	19.374
13	24.883	23.245
14	26.153	27.116
15	27.303	30.987

STATION NO. 13, AT X = 166.002 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.304	0.016
3	2.604	0.124
4	4.828	0.419
5	7.903	0.992
6	11.598	1.938
7	15.457	3.349
8	18.922	5.318
9	21.546	7.938
10	23.193	11.302
11	24.141	15.503
12	24.888	19.251
13	25.764	23.000
14	26.653	26.748
15	27.440	30.496

STATION NO. 14, AT X = 185.126 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.310	0.016
3	2.654	0.124
4	4.990	0.419
5	8.257	0.992
6	12.202	1.938
7	16.317	3.349
8	19.974	5.318
9	22.674	7.938
10	24.272	11.302
11	25.097	15.503
12	25.667	19.150
13	26.285	22.797
14	26.895	26.443
15	27.440	30.090

STATION NO. 15, AT X = 204.250 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.309	0.016
3	2.645	0.124
4	4.961	0.419
5	8.200	0.992
6	12.130	1.938
7	16.270	3.349
8	20.019	5.318
9	22.879	7.938
10	24.656	11.302
11	25.569	15.503
12	26.064	19.069
13	26.539	22.636
14	26.996	26.202
15	27.440	29.768

STATION NO. 16, AT X = 226.219 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.258
2	1.259	0.273
3	2.417	0.380
4	4.514	0.670
5	7.554	1.234
6	11.352	2.164
7	15.473	3.551
8	19.340	5.487
9	22.442	8.063
10	24.509	11.372
11	25.604	15.503
12	26.115	19.003
13	26.574	22.503
14	27.007	26.003
15	27.440	29.503

STATION NO. 17, AT X = 248.188 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	1.084
2	1.160	1.099
3	1.990	1.200
4	3.746	1.474
5	6.556	2.007
6	10.280	2.887
7	14.467	4.199
8	18.488	6.030
9	21.769	8.467
10	23.994	11.596
11	25.196	15.503
12	25.815	18.964
13	26.403	22.426
14	26.949	25.887
15	27.440	29.348

STATION NO. 18, AT X = 270.156 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	2.507
2	1.101	2.520
3	1.721	2.611
4	3.218	2.858
5	5.784	3.339
6	9.317	4.132
7	13.395	5.314
8	17.402	6.965
9	20.758	9.161
10	23.111	11.981
11	24.423	15.503
12	25.221	18.954
13	26.042	22.404
14	26.798	25.855
15	27.400	29.306

STATION NO. 19, AT X = 292.125 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	4.469
2	1.069	4.480
3	1.558	4.558
4	2.850	4.767
5	5.159	5.176
6	8.421	5.849
7	12.268	6.853
8	16.140	8.254
9	19.486	10.119
10	21.925	12.513
11	23.318	15.503
12	24.307	18.971
13	25.340	22.438
14	26.280	25.906
15	26.988	29.374

STATION NO. 20, AT X = 314.094 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	6.831
2	1.050	6.840
3	1.445	6.900
4	2.555	7.065
5	4.594	7.386
6	7.531	7.915
7	11.067	8.704
8	14.722	9.806
9	17.988	11.271
10	20.460	13.153
11	21.874	15.503
12	23.062	19.016
13	24.281	22.528
14	25.373	26.041
15	26.179	29.553

STATION NO. 21, AT X = 336.063 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	9.396
2	1.037	9.402
3	1.358	9.444
4	2.292	9.560
5	4.043	9.786
6	6.612	10.159
7	9.778	10.715
8	13.148	11.490
9	16.269	12.523
10	18.708	13.848
11	20.069	15.503
12	21.475	19.088
13	22.880	22.674
14	24.121	26.259
15	25.033	29.844

STATION NO. 22, AT X = 358.031 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	11.952
2	1.028	11.956
3	1.284	11.981
4	2.046	12.048
5	3.496	12.180
6	5.667	12.396
7	8.415	12.719
8	11.444	13.170
9	14.359	13.770
10	16.700	14.541
11	17.931	15.503
12	19.580	19.189
13	21.183	22.875
14	22.580	26.561
15	23.610	30.247

STATION NO. 23, AT X = 380.000 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	14.315
2	1.024	14.317
3	1.231	14.325
4	1.833	14.347
5	2.987	14.391
6	4.752	14.464
7	7.066	14.572
8	9.727	14.723
9	12.401	14.924
10	14.601	15.181
11	15.646	15.503
12	17.541	19.317
13	19.309	23.132
14	20.827	26.946
15	21.968	30.760

PRINTED REPORT NO. 3 - HULL BOUNDARY CONDITIONS

HULL OFFSETS IND-GENERATE
HULL BC IND-CONV DD
HULL STA IND-OPTIMUM

LBP, FT	380.00	LCB/LBP	0.515
BEAM, FT	51.00	LCF/LBP	0.571
DRAFT, FT	15.50	HALF SIDING WIDTH, FT	1.00
DEPTH STA 0, FT	37.60	BOT RAKE, FT	0.00
DEPTH STA 3, FT	34.42	FWD RAISED DECK LIMIT	
DEPTH STA 10, FT	30.00	AFT RAISED DECK LIMIT	
DEPTH STA 20, FT	30.76	RAISED DECK HT, FT	0.00
PRISMATIC COEF	0.570	WATERPLANE COEF	0.730
MAX SECTION COEF	0.795		
NO POINTS BELOW DWL	11.	FWD KEEL/BL LIMIT	0.034
NO POINTS ABOVE DWL	4.	AFT KEEL/BL LIMIT	0.538
POINT DIST FAC ABOVE DWL	3.000	BOW ANGLE, DEG	50.00
POINT DIST FAC BELOW DWL	1.000	BOW SHAPE FAC	0.000
BOW OVERHANG	0.049	STA 20 SECTION COEF	0.700
STERN OVERHANG	0.009	HULL FLARE ANGLE, DEG	

SECTIONAL AREA AND DWL CURVES

	AREA	DWL
STA 0 ORDINATE	0.000	0.005
STA 0 SLOPE	-0.833	-1.117
STA 20 ORDINATE	0.041	0.610
STA 20 SLOPE	0.722	0.751
PARALLEL MID LGTH	0.000	0.000
STA MAX ORDINATE	10.500	11.400
STA MAX AREA SLOPE	0.000	0.000
TENSOR NO 1	0.000	0.000
TENSOR NO 2	0.000	0.000
TENSOR NO 3	0.000	0.000
TENSOR NO 4	0.000	0.000
TENSOR/POLY SWITCH	-1.000	-1.000

DECK AT EDGE CURVE		FLAT OF BOTTOM CURVE	
STATION 0 OFFSET	0.406	STA OF TRANS START	10.000
STA 0 SLOPE	-1.800	SLOPE-STA OF TRANS START	0.000
STA 10 OFFSET	1.070	STA OF START OF MID	10.000
STA 10 SLOPE	0.000	STA OF END OF MID	10.000
STATION 20 OFFSET	0.856	STA OF TRANS END	10.000
STA 20 SLOPE	0.584	SLOPE-STA OF TRANS END	0.000
PARALLEL MID LGTH	0.254	FLAT OF BOT ANGLE, DEG	0.050
STA OF PARALLEL MID	11.205	ELLIPSE RATIO	1.000

SLOPES AT SECTION CURVES

	BOT	DWL	DAE
STA 0 ORDINATE, DEG	44.437	83.500	58.107
STA 0 SLOPE	126.543	96.943	68.339
STA 10 ORDINATE, DEG	2.351	82.000	83.000
STA 10 SLOPE	-0.500	0.000	0.000
STA 20 ORDINATE, DEG	3.000	63.333	76.556
STA 20 SLOPE	60.000	25.000	11.667
PARALLEL MID LGTH	0.060	0.000	0.000
STA OF PARALLEL MID	10.500	10.252	10.500

PRINTED REPORT NO. 4 - MARGIN LINE

MARGIN LINE IND-CALC
MIN FREEBOARD MARGIN, FT 0.25

DIST FROM FP FT	HT ABOVE BL FT
-18.36	38.49
-9.18	37.89
0.00	37.31
6.50	36.92
13.01	36.53
32.13	35.45
51.26	34.45
70.38	33.54
89.51	32.71
108.63	31.97
127.75	31.31
146.88	30.74
166.00	30.25
185.13	29.84
204.25	29.52
226.22	29.25
248.19	29.10
270.16	29.06
292.13	29.12
314.09	29.30
336.06	29.59
358.03	30.00
380.00	30.51

PRINTED REPORT NO. 5 - HULL SECTIONAL AREA CURVE

STATION	LOCATION,FT	AREA,FT2
1	-18.36	0.00
2	-9.18	0.00
3	0.00	0.00
4	6.50	18.18
5	13.01	36.89
6	32.13	96.67
7	51.26	164.94
8	70.38	240.98
9	89.51	321.80
10	108.63	402.87
11	127.75	478.80
12	146.88	543.96
13	166.00	593.18
14	185.13	622.22
15	204.25	628.21
16	226.22	605.33
17	248.19	552.18
18	270.16	473.62
19	292.13	377.59
20	314.09	274.32
21	336.06	175.00
22	358.03	89.92
23	380.00	26.03

ASSET/MONOSC VERSION 3.3+ - HULL SUBDIV MODULE - 2/11/95 10.45.50.

PRINTED REPORT NO. 1 - SUMMARY

HULL SUBDIV IND-CALC		INNER BOT IND-PRESENT	
SHAFT SUPPORT TYPE IND-POD			
LBP, FT	380.00	HULL AVG DECK HT, FT	10.57
DEPTH STA 10, FT	30.00		
		NO INTERNAL DECKS	2
HULL VOLUME, FT3	388003.	NO TRANS BHDS	13
MR VOLUME, FT3	49678.	NO LONG BHDS	0
TANKAGE VOL REQ, FT3	22382.	NO MACHY RMS	2
EXCESS TANKAGE, FT3	7813.	NO PROP SHAFTS	2
ARR AREA LOST TANKS, FT2	32.2		
HULL ARR AREA AVAIL, FT2	29486.0		

PRINTED REPORT NO. 2 - TRANSVERSE BULKHEADS

HULL SUBDIV IND-CALC	
NO TRANS BHDS	13
TRANS BHD SPACING(/LBP)	0.077

BULKHEAD NO	DISTANCE FROM FP,FT	DISTANCE FROM FP/LBP	MR FWD BHD LOC
1	19.00	0.050	
2	42.49	0.112	
3	65.98	0.174	
4	89.47	0.235	
5	112.96	0.297	
6	136.45	0.359	MMR
7	171.97	0.453	
8	201.23	0.530	
9	230.49	0.607	MMR
10	266.00	0.700	
11	294.50	0.775	
12	323.00	0.850	
13	351.50	0.925	

PRINTED REPORT NO. 3 - LONGITUDINAL BULKHEADS

NO LONG BHDS 0

PRINTED REPORT NO. 4 - INTERNAL DECKS AND INNER BOTTOM

HULL SUBDIV IND-CALC		INNER BOT IND-PRESENT	
NO INTERNAL DECKS	2	---------- INNER BOTTOM ----------	
DEPTH STA 10, FT	30.00	CVK HT, FT	4.50
HULL AVG DECK HT, FT	10.57	HORZ OFFSET HT, FT	
RAISED DECK HT, FT	0.00	HORZ OFFSET, FT	
		FLAT FWD LOC, FT	19.00
		FLAT AFT LOC, FT	292.42
		OFFSET FWD LOC, FT	
		OFFSET AFT LOC, FT	

INT DECK NO	DIST FROM BL AT .5 LBP,FT	DECK SHEER FRAC
1	20.00	1.0
2	12.25	0.0
IB	4.50	

INT DECK NO	AVL ARR AREA FT2	AVL ARR VOL FT3	USABLE TANKAGE FT3	VOIDS FT3	ARR AREA LOST TO TANKS,FT2
1	15905.2	174346.	0.	0.	0.0
2	9355.7	92327.	606.	309.	0.0
IB	4225.1	45118.	245.	0.	32.2
HOLD			29344.	56.	
TOTAL	29486.0	311791.	30195.	366.	32.2

PRINTED REPORT NO. 5 - LARGE OBJECT SPACES

SHAFT SUPPORT TYPE IND-POD

FOREPEAK VOID VOL, FT3	366.
FOREPEAK TANKAGE, FT3	731.
CHAIN LOCKER VOL, FT3	1097.
SEWAGE VOL REQ, FT3	245.
SHAFT ALLEY VOL, FT3	0.
ADDED STEER GEAR VOL, FT3	4895.
MR AFT BHD POS, FT	266.00
INNER BOT VOL, FT3	17508.

MR NO	TYPE	FWD BHD ID	UPR DECK ID	LGTH AVL FT	LGTH RQD FT	HT AVL FT	HT RQD FT	MR VOL FT3	INNER BOT VOL FT3
1	MMR	6	1	35.51	35.51	20.00	19.63	25422.	3505.
2	MMR	9	1	35.51	35.51	20.00	19.63	24255.	2233.
							TOTAL	49678.	5738.

PRINTED REPORT NO. 6 - HULL COMPARTMENT ARRANGEABLE AREA

NUMBER OF INTERNAL DECKS - 2
NUMBER OF TRANSVERSE BULKHEADS - 13
INNER BOTTOM INDICATOR - PRESENT

AREAS FOR EACH HULL COMPARTMENT:

DECK HT, FT ABL	20.0	12.3	4.5
COMP 1, FT2	284.0		
COMP 2, FT2	462.3	190.9	105.6
COMP 3, FT2	640.1	365.9	205.3
COMP 4, FT2	800.9	553.2	330.0
COMP 5, FT2	940.1	737.6	473.7
COMP 6, FT2	1052.9	900.6	620.5
COMP 7, FT2	1741.9	MMR	MMR
COMP 8, FT2	1511.4	1437.5	1086.4
COMP 9, FT2	1532.5	1460.3	1060.0
COMP 10, FT2	1836.3	MMR	MMR
COMP 11, FT2	1420.2	1287.4	375.9
COMP 12, FT2	1341.7	1140.7	
COMP 13, FT2	1234.6	845.7	
COMP 14, FT2	1106.3	435.7	

ASSET/MONOSC VERSION 3.3+ - DECKHOUSE MODULE - 2/11/95 10.46.02.

** WARNING - DECKHOUSE MODULE ** (W-DKHSAUTOXLIMIT-DKSCOM)
DECKHOUSE DIMENSIONS HAVE REACHED MAXIMUM ALLOWABLE LIMITS FOR "AUTO X" DECKHOUSE SIZING MODE. FOR A TOTAL SHIP AREA BALANCE, THE ADDITIONAL AMOUNT OF DECKHOUSE ARRANGEABLE AREA REQUIRED IS 1222.5 FT2.

PRINTED REPORT NO. 1 - DECKHOUSE SUMMARY

DKHS GEOM IND-GENERATE		BLAST RESIST IND-7 PSI	
DKHS SIZE IND-AUTO X		FIRE PROTECT IND-NONE	
DKHS MTRL TYPE IND-HTS			
LBP, FT	380.00	DKHS LENGTH OA, FT	200.37
BEAM, FT	51.00	DKHS MAX WIDTH, FT	54.93
AREA BEAM, FT	52.51	DKHS HT (W/O PLTHS), FT	42.50
DKHS FWD LIMIT-	STA 4.0	OTHER ARR AREA REQ, FT2	36769.60
DKHS AFT LIMIT-	STA 14.5	HULL ARR AREA AVAIL, FT2	29486.04
DKHS AVG DECK HT, FT	9.84	DKHS ARR AREA REQ, FT2	4850.58
DKHS NO LVLS	2	HANGER ARR AREA REQ, FT2	0.00
DKHS AVG SIDE CLR, FT	.00	PLTHS ARR AREA REQ, FT2	608.00
DKHS AVG SIDE ANG, DEG	10.00		
DKHS NO PRISMS	20	DKHS MAX ARR AREA, FT2	10911.68
DKHS ARR AREA DERIV, FT2	232.60	DKHS ARR AREA AVAIL, FT2	10911.68
DKHS MIN ALW BEAM, FT	20.73	DKHS VOLUME, FT3	110685.53
BRIDGE L-O-S OVER BOW, FT	250.09		
		DKHS WEIGHT, LTON	212.74
DKHS SIDE CLR OFFSET, FT		DKHS VCG, FT	36.29
DKHS SIDE ANG OFFSET, DEG			
DKHS DECK HT OFFSET, FT			

PRINTED REPORT NO. 2 - SUPERSTRUCTURE DECKHOUSES

NO OF SS DECKHOUSE BLKS	20
DKHS VOLUME, FT3	110686.
DKHS ARR AREA AVAIL, FT2	10911.7

	DECKHOUSE NUMBER				
	1	2	3	4	5
DIST FROM BOW, FT	76.00	86.55	97.09	107.64	118.18
LENGTH, FT	10.55	10.55	10.55	10.55	10.55
DIST FROM CL, FT					
FWD/PORT/BTM	-23.30	-24.31	-25.16	-25.86	-26.43
AFT/PORT/BTM	-24.31	-25.16	-25.86	-26.43	-26.85
FWD/STBD/BTM	23.30	24.31	25.16	25.86	26.43
AFT/STBD/BTM	24.31	25.16	25.86	26.43	26.85
FWD/PORT/TOP	-21.57	-22.58	-23.42	-24.13	-24.69
AFT/PORT/TOP	-22.58	-23.42	-24.13	-24.69	-25.11
FWD/STBD/TOP	21.57	22.58	23.42	24.13	24.69
AFT/STBD/TOP	22.58	23.42	24.13	24.69	25.11
DIST ABV BASELINE FWD, FT	33.54	33.09	32.66	32.26	31.88
DIST ABV BASELINE AFT, FT	33.09	32.66	32.26	31.88	31.53
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	4873.	5064.	5221.	5348.	5445.
ARR AREA, FT2	474.4	493.6	509.6	522.7	532.9

	DECKHOUSE NUMBER				
	6	7	8	9	10
DIST FROM BOW, FT	128.73	139.28	149.82	160.37	170.91
LENGTH, FT	10.55	10.55	10.55	10.55	10.55
DIST FROM CL, FT					
FWD/PORT/BTM	-26.85	-27.15	-27.35	-27.44	-27.44
AFT/PORT/BTM	-27.15	-27.35	-27.44	-27.44	-27.44
FWD/STBD/BTM	26.85	27.15	27.35	27.44	27.44
AFT/STBD/BTM	27.15	27.35	27.44	27.44	27.44
FWD/PORT/TOP	-25.11	-25.42	-25.61	-25.70	-25.70
AFT/PORT/TOP	-25.42	-25.61	-25.70	-25.70	-25.70
FWD/STBD/TOP	25.11	25.42	25.61	25.70	25.70
AFT/STBD/TOP	25.42	25.61	25.70	25.70	25.70
DIST ABV BASELINE FWD, FT	31.53	31.20	30.91	30.63	30.38
DIST ABV BASELINE AFT, FT	31.20	30.91	30.63	30.38	30.16
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	5515.	5560.	5583.	5585.	5579.
ARR AREA, FT2	540.4	545.5	548.5	549.4	549.5

	DECKHOUSE NUMBER				
	11	12	13	14	15
DIST FROM BOW, FT	181.46	192.01	202.55	213.10	223.64
LENGTH, FT	10.55	10.55	10.55	10.55	10.55
DIST FROM CL, FT					
FWD/PORT/BTM	-27.44	-27.44	-27.44	-27.44	-27.44
AFT/PORT/BTM	-27.44	-27.44	-27.44	-27.44	-27.44
FWD/STBD/BTM	27.44	27.44	27.44	27.44	27.44
AFT/STBD/BTM	27.44	27.44	27.44	27.44	27.44
FWD/PORT/TOP	-25.70	-25.70	-25.70	-25.70	-25.70
AFT/PORT/TOP	-25.70	-25.70	-25.70	-25.70	-25.70
FWD/STBD/TOP	25.70	25.70	25.70	25.70	25.70
AFT/STBD/TOP	25.70	25.70	25.70	25.70	25.70
DIST ABV BASELINE FWD, FT	30.16	29.96	29.79	29.65	29.53
DIST ABV BASELINE AFT, FT	29.96	29.79	29.65	29.53	29.43
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	5571.	5564.	5557.	5550.	5543.
ARR AREA, FT2	549.5	549.5	549.5	549.5	549.5

	DECKHOUSE NUMBER				
	16	17	18	19	20
DIST FROM BOW, FT	234.19	244.74	255.28	265.83	76.00
LENGTH, FT	10.55	10.55	10.55	10.55	22.64
DIST FROM CL, FT					
FWD/PORT/BTM	-27.44	-27.44	-27.47	-27.44	-15.57
AFT/PORT/BTM	-27.44	-27.47	-27.44	-27.32	-17.74
FWD/STBD/BTM	27.44	27.44	27.47	27.44	15.57
AFT/STBD/BTM	27.44	27.47	27.44	27.32	17.74
FWD/PORT/TOP	-25.70	-25.70	-25.73	-25.70	-13.83
AFT/PORT/TOP	-25.70	-25.73	-25.70	-25.59	-16.00
FWD/STBD/TOP	25.70	25.70	25.73	25.70	13.83
AFT/STBD/TOP	25.70	25.73	25.70	25.59	16.00
DIST ABV BASELINE FWD, FT	29.43	29.37	29.32	29.31	42.50
DIST ABV BASELINE AFT, FT	29.37	29.32	29.31	29.31	42.50
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	5536.	5531.	5524.	5501.	7035.
ARR AREA, FT2	549.5	549.8	549.7	548.2	700.8

PRINTED REPORT NO. 3 - DECKHOUSE STRUCTURE WEIGHT SUMMARY

DKHS MTRL TYPE IND-HTS
FIRE PROTECT IND-NONE
BLAST RESIST IND-7 PSI

DKHS STRUCT DENSITY, LBM/FT3 4.18
HANGER VOL, FT3 0.

	WT-LTON	VCG-FT	LCG-FT
CALCULATED SWBS150	212.7	36.29	171.84

DECK HOUSE	VOLUME FT3	VCG FROM BL FT
NO. 1	4873.	38.28
NO. 2	5064.	37.84
NO. 3	5221.	37.42
NO. 4	5348.	37.03
NO. 5	5445.	36.66
NO. 6	5515.	36.31
NO. 7	5560.	36.00
NO. 8	5583.	35.70
NO. 9	5585.	35.44
NO.10	5579.	35.20
NO.11	5571.	34.98
NO.12	5564.	34.79
NO.13	5557.	34.62
NO.14	5550.	34.49
NO.15	5543.	34.37
NO.16	5536.	34.28
NO.17	5531.	34.22
NO.18	5524.	34.19
NO.19	5501.	34.17
NO.20	7035.	47.33
	110686.	36.29

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ASSET/MONOSC VERSION 3.3+ - HULL STRUCT MODULE - 2/11/95  10.46.19.

 PRINTED REPORT NO. 1 - SUMMARY

 INNER BOT IND-PRESENT                  HULL LOADS IND-CALC
 STIFFENER SHAPE IND-CALC
 ----------------------- HULL STRENGTH AND STRESS ----------------------
 HOGGING BM, FT-LTON         65606.     PRIM STRESS KEEL-HOG, KSI    15.46
 SAGGING BM, FT-LTON         54696.     PRIM STRESS KEEL-SAG, KSI    12.89
 MIDSHIP MOI, FT2-IN2       139568.     PRIM STRESS DECK-HOG, KSI    16.14
 DIST N.A. TO KEEL, FT        14.68     PRIM STRESS DECK-SAG, KSI    13.45
 DIST N.A. TO DECK, FT        15.33     HULL MARGIN STRESS, KSI       2.24
 SEC MOD TO KEEL, FT-IN2      9507.     SEC MOD TO DECK, FT-IN2      9106.
 HULL STRUCTURE COMPONENTS
                    MATERIAL   NO OF    NO
                      TYPE    SEGMENT
                    -----------------------
   WET. DECK        HTS          4       1
   SIDE SHELL       HTS          4       1
   BOTTOM SHELL     HTS          6       1
   INNER BOTTOM     HTS          5       1
   INT. DECK        HTS          4       2
   STRINGER, SHEER  HTS          1       1
   LONG BULKHEAD                         0
   TRANS BULKHEAD   HTS                 13

HULL STRUCTURE WEIGHT
 SWBS    COMPONENT                WEIGHT, LTON    VCG, FT
 ---------------------------------------------------------
 100  HULL STRUCTURE                 759.2         18.72
   110   SHELL+SUPPORT                 362.0         13.95
   120   HULL STRUCTURAL BHD            78.0         18.79
   130   HULL DECKS                    261.0         26.76
   140   HULL PLATFORM/FLATS            58.2         12.21

 PRINTED REPORT NO. 2 - HULL STRUCTURES WEIGHT

 SWBS          COMPONENT                           WT-LTON        VCG-FT
 ====          =========                         ============   ============
  100  HULL STRUCTURES                             759.2         18.72
    110  SHELL + SUPPORTS                             362.0         13.95
      111  PLATING                                       218.6         18.75
      113  INNER BOTTOM                                   36.5          4.50
      115  STANCHIONS                                      5.1         15.00
      116  LONG FRAMING                                   63.8          1.47
      117  TRANS FRAMING                                  38.1         16.24
    120  HULL STRUCTURAL BULKHDS                       78.0         18.79
      121  LONG BULKHDS
      122  TRANS BULKHDS                                  66.6         18.79
      123  TRUNKS + ENCLOSURES                            11.3         18.79
    130  HULL DECKS                                   261.0         26.76
      131  MAIN DECK                                     153.3         31.05
      132  2ND DECK                                      107.7         20.66
      133  3RD DECK
      134  4TH DECK
      135  5TH DECK+DECKS BELOW
      136  01 HULL DECK
    140  HULL PLATFORMS/FLATS                          58.2         12.21
      141  1ST PLATFORM                                   58.2         12.21
      142  2ND PLATFORM
      143  3RD PLATFORM
      144  4TH PLATFORM
      145  5TH PLAT+PLATS BELOW

           * DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

 PRINTED REPORT NO. 3 - WEATHER DECK

 DECK MTRL TYPE-HTS
 STRINGER PLATE MTRL TYPE-HTS
                                          SHELL       STRINGER PLATE
   MODULUS OF ELASTICITY, KSI           29600.0        29600.0
   DENSITY, LBM/FT3                      489.02         489.02
   YIELD STRENGTH, KSI                    45.00          45.00
   MAX PRIMARY STRENGTH, KSI              21.28          21.28
   ALLOWABLE WORKING STRENGTH, KSI        38.00          38.00

 HULL LOADS IND-CALC
                                 MAX       MIN
 STIFFENER SPACING, IN          24.00     24.00
 STRINGER PLATE WIDTH, FT        6.00
```

SEGMENT GEOMETRY

SEG	YIB	ZIB	YOB	ZOB	HEAD1	HEAD2
	--------NODE COORD, FT				--SCND. LOAD, FT--	
1	0.00	30.01	6.86	30.01	8.25	
2	6.86	30.01	13.72	30.01	8.25	
3	13.72	30.01	20.58	30.01	8.25	
4	20.58	30.01	27.44	30.01	8.25	

SEGMENT SCANTLINGS

SEG	STIFFENERS INXINXIN/IN				CATLG NO	NO.OF STIFF	PLATE TK, IN	SPACING IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.58
2 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.58
3 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.58
4 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.58

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

SEG	AREA TOTAL IN2	AREA SHEAR IN2	N.A. TO PLATE IN	SEC MOD PLATE IN3	SEC MOD FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
1	8.52	0.73	0.70	19.92	3.91	28.92	0.20
2	8.52	0.73	0.70	19.92	3.91	28.92	0.20
3	8.52	0.73	0.70	19.92	3.91	28.92	0.20
4	8.52	0.73	0.70	19.92	3.91	28.92	0.20

PRINTED REPORT NO. 4 - SIDE SHELL

SIDE SHELL MTRL TYPE-HTS
SHEER STRAKE MTRL TYPE-HTS

	SHELL	SHEER STRAKE
MODULUS OF ELASTICITY, KSI	29600.0	29600.0
DENSITY, LBM/FT3	489.02	489.02
YIELD STRENGTH, KSI	45.00	45.00
MAX PRIMARY STRENGTH, KSI	21.28	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00
SHEER STRAKE WIDTH, FT	6.00	

SEGMENT GEOMETRY

SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
	--------NODE COORD, FT				--SCND. LOAD, FT--	
1	27.44	30.01	26.55	24.01	7.81	
2	26.55	24.01	25.91	20.00	12.00	
3	25.91	20.00	24.58	12.25	17.89	
4	24.58	12.25	20.81	6.00	25.20	

SEGMENT SCANTLINGS

SEG	STIFFENERS INXINXIN/IN				CATLG NO	NO.OF STIFF	PLATE TK, IN	SPACING IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	4	0.2500	18.20
2 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.24
3 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2813	23.60
4 *R	4.730X	3.960X	0.190/	0.210	2.	4	0.3125	22.33

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

SEG	AREA TOTAL IN2	AREA SHEAR IN2	N.A. TO PLATE IN	SEC MOD PLATE IN3	SEC MOD FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
1	5.99	0.71	0.87	14.53	3.80	20.34	0.32
2	5.50	0.71	0.94	13.18	3.79	18.68	0.35
3	8.08	0.72	0.70	19.58	3.86	27.43	0.22
4	8.71	1.00	0.89	26.20	5.36	29.57	0.25

PRINTED REPORT NO. 5 - BOTTOM SHELL

BOTTOM SHELL MTRL TYPE-HTS

MODULUS OF ELASTICITY, KSI	29600.0
DENSITY, LBM/FT3	489.02
YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

	--------NODE COORD, FT				--SCND. LOAD, FT--	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
1	20.81	6.00	18.61	4.50	28.83	
2	18.61	4.50	16.46	3.44	30.06	
3	16.46	3.44	12.35	2.00	31.35	
4	12.35	2.00	8.23	0.99	32.55	
5	8.23	0.99	4.12	0.31	33.39	
6	4.12	0.31	0.00	0.00	33.89	

SEGMENT SCANTLINGS

	-----SCANTLINGS OF STIFFENED PLATES-----							
	STIFFENERS				CATLG	NO.OF	PLATE	SPACING
SEG	---------INXINXIN/IN---------				NO	STIFF	TK, IN	IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	1	0.3438	16.03
2 *R	3.745X	3.940X	0.170/	0.205	1.	1	0.3438	14.21
3 *R	4.730X	3.960X	0.190/	0.210	2.	2	0.3438	17.45
4 *R	4.730X	3.960X	0.190/	0.210	2.	2	0.3438	17.03
5 *R	4.730X	3.960X	0.190/	0.210	2.	2	0.3438	16.49
6 *R	4.730X	3.960X	0.190/	0.210	2.	1	0.3438	19.14

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

	-----PROPERTIES OF STIFFENED PLATES-----						
	------AREA------		N.A. TO	-----SEC MOD-----			SMEAR
	TOTAL	SHEAR	PLATE	PLATE	FLANGE	WT/FT	RATIO
SEG	IN2	IN2	IN	IN3	IN3	LBF/FT	
1	6.95	0.73	0.82	16.36	3.89	23.60	0.26
2	6.33	0.73	0.89	14.84	3.88	21.48	0.29
3	7.73	1.00	1.00	22.85	5.37	26.25	0.29
4	7.59	1.00	1.02	22.39	5.36	25.76	0.30
5	7.40	1.00	1.04	21.80	5.36	25.13	0.31
6	8.31	1.00	0.95	24.65	5.38	28.22	0.26

PRINTED REPORT NO. 6 - INNER BOTTOM

INNER BOT IND-PRESENT

INNER BOTTOM MTRL TYPE-HTS

MODULUS OF ELASTICITY, KSI	29600.0
DENSITY, LBM/FT3	489.02
YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

	--------NODE COORD, FT				--SCND. LOAD, FT--	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
1	18.61	4.50	16.46	4.50	2.62	30.92
2	16.46	4.50	12.35	4.50	2.70	29.44
3	12.35	4.50	8.23	4.50	2.70	27.38
4	8.23	4.50	4.12	4.50	2.70	25.32
5	4.12	4.50	0.00	4.50	2.70	23.26

SEGMENT SCANTLINGS

SEG	STIFFENERS INXINXIN/IN				CATLG NO	NO.OF STIFF	PLATE TK, IN	SPACING IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	1	0.2188	12.87
2 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46
3 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46
4 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46
5 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

SEG	AREA TOTAL IN2	AREA SHEAR IN2	N.A. TO PLATE IN	SEC MOD PLATE IN3	SEC MOD FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
1	4.26	0.71	1.15	9.70	3.72	14.45	0.51
2	5.56	0.71	0.93	13.34	3.79	18.87	0.35
3	5.56	0.71	0.93	13.34	3.79	18.87	0.35
4	5.56	0.71	0.93	13.34	3.79	18.87	0.35
5	5.56	0.71	0.93	13.34	3.79	18.87	0.35

PRINTED REPORT NO. 7 - INTERNAL DECKS

NUMBER OF INTERNAL DECKS 2

INTERNAL DECK MTRL TYPE-HTS

MODULUS OF ELASTICITY, KSI	29600.0
DENSITY, LBM/FT3	489.02
YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

SEG	YIB	ZIB	YOB	ZOB	SCND. LOAD, FT HEAD1	HEAD2
DECK NO.1						
SEG						
1	0.00	20.00	6.86	20.00	2.67	17.21
2	6.86	20.00	13.72	20.00	2.67	20.64
3	13.72	20.00	20.58	20.00	2.67	25.07
4	20.58	20.00	25.91	20.00	2.72	20.46
DECK NO.2						
SEG						
1	0.00	12.25	6.86	12.25	2.67	17.21
2	6.86	12.25	13.72	12.25	2.67	20.64
3	13.72	12.25	24.58	12.25	2.67	25.07

SEGMENT SCANTLINGS

SEG	STIFFENERS INXINXIN/IN				CATLG NO	NO.OF STIFF	PLATE TK, IN	SPACING IN
DECK NO.1								
SEG								
1 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.58
2 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.58
3 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.58
4 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2813	21.32
DECK NO.2								
SEG								
1 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.58
2 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.58
3 *R	3.745X	3.940X	0.170/	0.205	1.	5	0.2188	21.72

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

PROPERTIES OF STIFFENED PLATES

SEG	AREA TOTAL IN2	AREA SHEAR IN2	N.A. TO PLATE IN	SEC MOD PLATE IN3	SEC MOD FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
DECK NO.1							
SEG							
1	5.94	0.71	0.86	14.60	3.78	20.18	0.32
2	5.94	0.71	0.86	14.60	3.78	20.18	0.32
3	5.94	0.71	0.86	14.60	3.78	20.18	0.32
4	7.44	0.72	0.74	18.03	3.85	25.25	0.24
DECK NO.2							
SEG							
1	5.94	0.71	0.86	14.60	3.78	20.18	0.32
2	5.94	0.71	0.86	14.60	3.78	20.18	0.32
3	6.19	0.71	0.83	15.29	3.79	21.03	0.30

PRINTED REPORT NO. 8 - STRENGTH AND STRESS OF STIFFENED PLATE AT DESIGN LOAD

INNER BOT IND-PRESENT

SEG	PRIMARY STRESS TENSION KSI	PRIMARY STRESS COMP. KSI	LOCAL STRESS BEND. KSI	LOCAL STRESS SHEAR KSI	STRENGTH BUCKL. KSI	STRENGTH ULTIMATE KSI	STRENGTH COLUMN KSI
WET DECK							
1	16.11	13.43	6.61	2.22	29.86	33.05	33.54
2	16.11	13.43	6.61	2.22	29.86	33.05	33.54
3	16.11	13.43	6.61	2.22	29.86	33.05	33.54
4	16.11	13.43	6.61	2.22	29.86	33.05	33.54
SIDE SHELL							
1	14.53	12.27	5.69	1.90	20.20	28.69	36.11
2	11.95	10.38	7.84	2.60	25.37	31.21	36.70
3	8.90	8.14	16.66	5.59	15.21	25.70	33.81
4	9.81	10.47	15.99	5.37	20.96	29.10	38.31
BOT SHELL							
1	10.94	12.35	18.10	6.03	38.99	38.68	35.27
2	11.32	12.99	16.79	5.57	41.08	41.17	35.98
3	11.72	13.66	15.54	5.19	36.98	36.79	39.15
4	12.09	14.28	15.76	5.26	37.60	37.34	39.27
5	12.35	14.72	15.67	5.22	38.37	38.06	39.43
6	12.50	14.98	18.38	6.16	34.25	34.71	38.69
INNER BOT							
1	11.15	12.71	16.31	5.35	30.95	33.46	38.13
2	11.15	12.71	19.48	6.47	24.67	30.90	36.63
3	11.15	12.71	18.12	6.01	24.67	30.90	36.63
4	11.15	12.71	16.76	5.56	24.67	30.90	36.63
5	11.15	12.71	15.39	5.11	24.67	30.90	36.63
INT DECK NO. 1							
1	10.91	9.62	14.27	4.76	12.10	23.43	36.08
2	10.91	9.62	17.12	5.71	12.10	23.43	36.08
3	10.91	9.62	20.79	6.94	12.10	23.43	36.08
4	10.91	9.62	17.25	5.78	18.63	27.82	34.52
INT DECK NO. 2							
1	0.00	0.00	14.27	4.76	12.10	23.43	36.08
2	0.00	0.00	17.12	5.71	12.10	23.43	36.08
3	0.00	0.00	21.90	7.32	10.86	22.41	35.78

PRINTED REPORT NO. 9 - FACTOR OF SAFETY OF STIFFENED PLATE AT DESIGN LOAD

INNER BOT IND-PRESENT

SEG	--PLATE- BUCKLING	-STIFFENER- SHEAR	--------STIFFENED PLATE---------- COMP+BEND	ULTIMATE	TENSION+BEND.
WET DECK					
1	2.12	10.29	1.30	1.40	1.67
2	2.12	10.29	1.30	1.40	1.67
3	2.12	10.29	1.30	1.40	1.67
4	2.12	10.29	1.30	1.40	1.67
SIDE SHELL					
1	1.55	12.03	1.52	1.41	1.88
2	2.20	8.77	1.59	1.76	1.92
3	1.55	4.08	1.25	1.57	1.49
4	1.72	4.24	1.31	1.63	1.47
BOT SHELL					
1	2.68	3.78	1.00	1.67	1.31
2	2.70	4.09	1.02	1.73	1.35
3	2.38	4.39	1.18	1.65	1.39
4	2.32	4.33	1.15	1.61	1.36
5	2.30	4.36	1.14	1.60	1.36
6	2.01	3.70	1.03	1.40	1.23
INNER BOT					
1	9.64	4.26	2.33	7.07	2.33
2	8.68	3.53	1.95	7.08	1.95
3	9.33	3.79	2.10	7.61	2.10
4	10.09	4.10	2.27	8.23	2.27
5	10.98	4.46	2.47	8.95	2.47
INT DECK NO. 1					
1	6.37	4.79	2.66	7.91	2.66
2	5.31	3.99	2.22	6.60	2.22
3	4.37	3.29	1.83	5.43	1.83
4	9.84	3.95	2.20	9.02	2.20
INT DECK NO. 2					
1	6.37	4.79	2.66	7.91	2.66
2	5.31	3.99	2.22	6.60	2.22
3	3.90	3.12	1.73	5.11	1.73

PRINTED REPORT NO. 10 - GIRDER PROPERTIES, STRENGTH ,STRESSES AND FACTOR OF SAFETY

DECK MTRL TYPE-HTS
BOT MTRL TYPE-HTS

HULL LOADS IND-CALC

GIRDER/STIFF.,POSITION	------COORDINATE, FT----- YLOC	ZLOC	--SCND. LOAD, FT-- HEAD1	HEAD2
WET DECK GIRDER				
1	0.00	30.01	8.40	
2	6.86	30.01	8.40	
3	13.72	30.01	8.40	
4	20.58	30.01	8.40	
INT DECK 1. GIRDER				
1	0.00	20.00	2.70	8.82
2	6.86	20.00	2.70	12.25
3	13.72	20.00	2.70	15.68
4	20.58	20.00	2.70	19.11
INT DECK 2. GIRDER				
1	0.00	12.25	2.70	15.53
2	6.86	12.25	2.70	18.96
3	13.72	12.25	2.70	22.39
BOTTOM GIRDER				
1	0.00	0.00	0.29	34.01
2	4.12	0.31	0.29	33.70
3	8.23	0.99	0.29	33.02
4	12.35	2.00	0.29	32.01
5	16.46	3.44	0.29	31.31
BOTTOM STIFF.				
1	0.00	2.25	0.29	31.76
2	4.12	2.41	0.27	31.60
3	8.23	2.75	0.21	31.26

4	12.35	3.25	0.21	30.76
5	16.46	3.97	0.21	30.77

	GIRDER/STIFFENER ------------INXINXIN/IN------------				CATLG NO	PLATE TK, IN	SUPPORT WIDTH IN
GIRDER							
1 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.32
2 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.32
3 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.32
4 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.32
INT DECK 1.							
GIRDER							
1 *F	9.780X	4.010X	0.240/	0.330	29.	0.2188	82.32
2 *F	11.810X	4.010X	0.235/	0.350	35.	0.2188	82.32
3 *F	11.840X	6.490X	0.230/	0.380	45.	0.2188	82.32
4 *F	11.840X	6.490X	0.230/	0.380	45.	0.2188	73.14
INT DECK 2.							
GIRDER							
1 *F	11.840X	6.490X	0.230/	0.380	45.	0.2188	82.32
2 *F	13.490X	5.030X	0.255/	0.420	49.	0.2188	82.32
3 *F	15.430X	6.990X	0.295/	0.430	67.	0.2188	106.31
BOTTOM							
GIRDER							
1	54.000X	17.190X	0.344/	0.250		0.3438	38.28
2	50.276X	15.625X	0.313/	0.250		0.3438	43.87
3	42.085X	12.500X	0.250/	0.250		0.3438	50.28
4	30.031X	12.500X	0.250/	0.250		0.3438	51.73
5	12.745X	12.500X	0.250/	0.219		0.3438	52.36
BOTTOM							
STIFF.							
1 *R	3.745X	3.940X	0.170/	0.205	1.	0.3438	27.00
2 *R	3.745X	3.940X	0.170/	0.205	1.	0.3125	27.00
3 *R	3.745X	3.940X	0.170/	0.205	1.	0.2500	27.00
4 *R	3.745X	3.940X	0.170/	0.205	1.	0.2500	27.00
5 *R	3.745X	3.940X	0.170/	0.205	1.	0.2500	27.00

NOTE: *F STANDS FOR FABRICATED SHAPE
*R STANDS FOR ROLLED SHAPE

----------------PROPERTIES OF GDR/STF AND PLATES----------------

	------AREA------ TOTAL IN2	SHEAR IN2	N.A. TO PLATE IN	-----SEC MOD----- PLATE IN3	FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
WET DECK							
GIRDER							
1	33.85	3.63	1.74	310.30	43.13	114.96	0.20
2	33.85	3.63	1.74	310.30	43.13	114.96	0.20
3	33.85	3.63	1.74	310.30	43.13	114.96	0.20
4	33.85	3.63	1.74	310.30	43.13	114.96	0.20
INT DECK 1.							
GIRDER							
1	21.68	2.48	1.26	144.09	20.09	73.63	0.20
2	22.19	2.91	1.63	176.39	26.70	75.36	0.23
3	23.20	2.86	2.11	190.55	38.86	78.79	0.29
4	21.19	2.86	2.30	171.01	38.72	71.97	0.32
INT DECK 2.							
GIRDER							
1	23.20	2.86	2.11	190.55	38.86	78.79	0.29
2	23.56	3.60	2.35	212.34	42.30	80.01	0.31
3	30.82	4.74	2.80	318.24	67.18	104.66	0.33
BOTTOM							
GIRDER							
1	28.77	18.77	25.81	463.68	415.90	97.71	0.00
2	24.99	15.90	23.99	383.00	341.82	84.86	0.00
3	17.94	10.67	19.99	242.71	213.88	60.94	0.00
4	14.93	7.66	14.16	158.96	136.65	50.70	0.00
5	10.22	3.33	5.70	58.18	43.58	34.70	0.00
BOTTOM							
STIFF.							
1	10.72	0.73	0.60	24.43	3.93	36.41	0.16
2	9.88	0.72	0.61	23.21	3.90	33.54	0.17
3	8.19	0.71	0.67	20.21	3.84	27.81	0.21
4	8.19	0.71	0.67	20.21	3.84	27.81	0.21
5	8.19	0.71	0.67	20.21	3.84	27.81	0.21

---------------SCANTLINGS OF GDR/STF AND PLATE-------------

-----------------STRENGTH AND STRESSES OF GDR.STF------------
AT DESIGN LOAD

	-PRIMARY STRESS- TENSION KSI	COMP. KSI	-LOCAL STRESS- BEND. KSI	SHEAR KSI	--------STRENGTH-------- BUCKL. KSI	ULTIMATE KSI	COLUMN KSI
WET DECK GIRDER							
1	16.11	13.43	16.01	4.64	35.83	35.87	37.43
2	16.11	13.43	16.01	4.64	35.83	35.87	37.43
3	16.11	13.43	16.01	4.64	35.83	35.87	37.43
4	16.11	13.43	16.01	4.64	35.83	35.87	37.43
INT DECK 1. GIRDER							
1	10.91	9.62	36.11	7.14	41.28	41.44	30.58
2	10.91	9.62	37.73	8.45	37.24	37.02	35.43
3	10.91	9.62	33.19	11.00	36.60	36.48	38.16
4	10.91	9.62	36.06	11.91	36.60	36.48	38.74
INT DECK 2. GIRDER							
1	0.00	0.00	32.87	10.90	36.60	36.48	38.16
2	0.00	0.00	36.86	10.57	35.83	35.87	39.82
3	0.00	0.00	35.40	12.24	36.16	36.12	42.11
BOTTOM GIRDER							
1	12.54	15.04	0.03	0.01	17.35	27.07	45.00
2	12.44	14.88	0.04	0.02	16.54	26.56	45.00
3	12.23	14.53	7.75	3.79	15.11	25.63	45.00
4	11.92	14.00	12.11	5.27	29.66	32.98	45.00
5	11.48	13.26	37.59	12.02	44.39	45.00	42.86
BOTTOM STIFF.							
1	11.84	13.87	33.24	11.19	44.66	45.00	31.28
2	11.79	13.79	33.33	11.22	44.66	45.00	32.01
3	11.69	13.62	33.49	11.26	44.66	45.00	33.58
4	11.53	13.35	32.95	11.08	44.66	45.00	33.58
5	11.31	12.98	32.96	11.09	44.66	45.00	33.58

------------------FACTOR OF SAFETY OF GDR.STF----------
AT DESIGN LOAD

	--PLATE- BUCKLING	-STIFFENER- SHEAR	--------STIFFENED PLATE----------- COMP+BEND	ULTIMATE	TENSION+BEND.
WET DECK GIRDER					
1	2.46	4.92	1.05	1.64	1.18
2	2.46	4.92	1.05	1.64	1.18
3	2.46	4.92	1.05	1.64	1.18
4	2.46	4.92	1.05	1.64	1.18
INT DECK 1. GIRDER					
1	15.97	3.19	1.05	8.72	1.05
2	12.70	2.70	1.01	7.95	1.01
3	10.53	2.07	1.15	7.12	1.15
4	8.73	1.91	1.05	5.99	1.05
INT DECK 2. GIRDER					
1	10.63	2.09	1.16	7.19	1.16
2	9.50	2.16	1.03	6.73	1.03
3	9.42	1.86	1.07	7.05	1.07
BOTTOM GIRDER					
1	1.15	1559.32	2.39	1.44	3.02
2	1.11	1152.26	2.41	1.43	3.04
3	4.30	6.01	4.90	5.84	4.90
4	5.55	4.32	3.14	4.94	3.14
5	3.07	1.90	1.01	2.37	1.01
BOTTOM STIFF.					
1	16.26	2.04	1.14	9.11	1.14
2	15.52	2.03	1.14	8.90	1.14
3	13.66	2.02	1.13	8.22	1.13
4	13.88	2.06	1.15	8.35	1.15
5	13.88	2.06	1.15	8.35	1.15

PRINTED REPORT NO. 11 - LONGITUDINAL BULKHEADS

NUMBER OF LONG BHD 0

PRINTED REPORT NO. 12 - TRANSVERSE BULKHEADS

TRANS BHD MTRL TYPE-HTS

MODULUS OF ELASTICITY, KSI	29600.0
DENSITY, LBM/FT3	489.02
YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

	--------NODE COORD, FT			--------------------	SCND. LOAD, FT--	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
1	0.00	30.01	0.00	20.00	21.57	
2	0.00	20.00	0.00	12.25	27.62	
3	0.00	12.25	0.00	4.50	31.34	

SEGMENT SCANTLINGS

SEG	STIFFENERS INXINXIN/IN				CATLG NO	NO.OF STIFF	PLATE TK, IN	SPACING IN
1 *F	7.685X	3.940X	0.170/	0.205	6	16	0.1875	24.02
2 *R	5.735X	3.970X	0.200/	0.225	5	15	0.1875	23.25
3 *F	7.685X	3.940X	0.170/	0.205	6	15	0.1875	23.25

NOTE: *F STANDS FOR FABRICATED SHAPE
*R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

PROPERTIES OF STIFFENED PLATES

SEG	AREA TOTAL IN2	AREA SHEAR IN2	N.A. TO PLATE IN	SEC MOD PLATE IN3	SEC MOD FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
1	6.61	1.37	1.83	31.02	9.09	22.46	0.47
2	6.40	1.23	1.45	22.62	7.00	21.73	0.47
3	6.47	1.37	1.87	30.14	9.07	21.97	0.48

STRENGTH AND STRESSES AT DESIGN LOAD

SEG	LOCAL STRESS BEND. KSI	LOCAL STRESS SHEAR KSI	STRENGTH BUCKL. KSI	STRENGTH ULTIMATE KSI	STRENGTH COLUMN KSI
1	35.16	8.51	10.86	22.41	35.78
2	37.91	9.78	10.86	22.41	35.78
3	34.13	11.54	10.86	22.41	35.78

FACTOR OF SAFETY AT DESIGN LOAD

SEG	PLATE BUCKLING	STIFFENER SHEAR	STIFFENED PLATE COMP+BEND	STIFFENED PLATE ULTIMATE	STIFFENED PLATE TENSION+BEND.
1	3.90	2.68	1.08	5.11	1.73
2	3.90	2.33	1.00	5.11	1.73
3	3.90	1.98	1.11	5.11	1.73

PRINTED REPORT NO. 13 - SIDE AND BOTTOM FRAMES

FRAME SPACING, FT 8.00

SEGMENT GEOMETRY

SEG	NODE COORD, FT YUPR	ZUPR	YLWR	ZLWR	SCND. LOAD, FT HEAD1	HEAD2
SIDE FRAME						
1	27.44	30.01	25.91	20.00	14.01	
2	25.91	20.00	24.58	12.25	21.76	
3	24.58	12.25	18.61	4.50	29.51	
BOT FRAME						
1	18.61	4.50	16.46	3.44	30.57	
2	16.46	3.44	12.35	2.00	32.01	
3	12.35	2.00	8.23	0.99	33.02	
4	8.23	0.99	4.12	0.31	33.70	
5	4.12	0.31	0.00	0.00	34.01	

SEGMENT SCANTLINGS

SCANTLINGS OF STIFFENED PLATES

SEG	STIFFENERS INXINXIN/IN				CATLG NO	PLATE TK, IN	SPAN FT
SIDE FRAME							
1 *F	11.810X	4.010X	0.235/	0.350	35.	0.2500	10.01
2 *F	11.810X	4.010X	0.235/	0.350	35.	0.2500	7.75
3 *F	13.405X	5.000X	0.230/	0.335	40.	0.2813	7.75
BOT FRAME							
1	6.372X	6.372X	0.219/	0.219		0.3438	2.39
2	21.388X	12.500X	0.250/	0.250		0.3438	4.36
3	36.058X	12.500X	0.250/	0.250		0.3438	4.24
4	46.180X	12.500X	0.250/	0.250		0.3438	4.17
5	52.138X	12.500X	0.250/	0.250		0.3438	4.13

NOTE: *F STANDS FOR FABRICATED SHAPE

SEGMENT PROPERTIES

PROPERTIES OF STIFFENED PLATES

SEG	AREA TOTAL IN2	AREA SHEAR IN2	N.A. TO PLATE IN	SEC MOD PLATE IN3	SEC MOD FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO

SIDE FRAME							
SEG							
1	28.18	2.92	1.32	225.92	26.95	95.70	0.17
2	28.18	2.92	1.32	225.92	26.95	95.70	0.17
3	31.76	3.22	1.53	290.81	35.58	107.87	0.18
BOT FRAME							
SEG							
1	4.98	1.52	2.98	14.47	10.88	16.91	0.18
2	12.77	5.50	10.03	106.10	89.02	43.37	0.18
3	16.44	9.16	17.07	199.36	173.70	55.82	0.18
4	18.97	11.69	21.99	273.87	242.96	64.41	0.18
5	20.46	13.18	24.90	321.64	287.80	69.47	0.18

STRESS AND FACTOR OF SAFETY

	-STRESS, KSI-		------FOS-----	
	BENDING	SHEAR	BENDING	SHEAR
SIDE FRAME				
SEG				
1	36.00	12.38	1.06	1.84
2	33.53	14.89	1.13	1.53
3	34.55	18.26	1.10	1.25
BOT FRAME				
SEG				
1	17.43	12.42	2.18	1.84
2	7.78	6.54	4.88	3.48
3	3.95	3.93	9.63	5.80
4	2.82	3.10	13.49	7.36
5	2.36	2.74	16.09	8.31

PRINTED REPORT NO. 14 - DECK BEAMS

FRAME SPACING, FT 8.00

SEGMENT GEOMETRY

	--------NODE COORD, FT			-------------------	-SCND. LOAD, FT--	
SEG	YIB	ZIB	YOB	ZOB	HEAD1	HEAD2
WET DECK						
SEG						
1	0.00	30.01	6.86	30.01	8.40	
2	6.86	30.01	13.72	30.01	8.40	
3	13.72	30.01	20.58	30.01	8.40	
4	20.58	30.01	27.44	30.01	8.40	
DECK NO. 1						
SEG						
1	0.00	20.00	6.86	20.00	2.70	
2	6.86	20.00	13.72	20.00	2.70	
3	13.72	20.00	20.58	20.00	2.70	
4	20.58	20.00	25.91	20.00	2.81	
DECK NO. 2						
SEG						
1	0.00	12.25	6.86	12.25	2.70	
2	6.86	12.25	13.72	12.25	2.70	
3	13.72	12.25	24.58	12.25	2.70	

SEGMENT SCANTLINGS

	----------------SCANTLINGS OF STIFFENED PLATES-----------------						
	STIFFENERS ---------INXINXIN/IN--------------				CATLG NO	PLATE TK, IN	SPAN FT
WET DECK							
SEG							
1 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
2 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
3 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
4 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
DECK NO. 1							
SEG							
1 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
2 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
3 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
4 *R	3.745X	3.940X	0.170/	0.205	1.	0.2813	5.33
DECK NO. 2							
SEG							
1 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
2 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
3 *F	5.685X	3.940X	0.170/	0.215	3.	0.2188	10.86

NOTE: *F STANDS FOR FABRICATED SHAPE
*R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

	----------------PROPERTIES OF STIFFENED PLATES------------------						
	------AREA------		N.A. TO	-----SEC MOD-----			SMEAR
SEG	TOTAL IN2	SHEAR IN2	PLATE IN	PLATE IN3	FLANGE IN3	WT/FT LBF/FT	RATIO
WET DECK							
SEG							
1	35.04	1.26	0.42	103.33	7.46	119.01	0.06
2	35.04	1.26	0.42	103.33	7.46	119.01	0.06
3	35.04	1.26	0.42	103.33	7.46	119.01	0.06
4	35.04	1.26	0.42	103.33	7.46	119.01	0.06
DECK NO. 1							
SEG							
1	22.44	0.71	0.31	48.67	3.88	76.22	0.07
2	22.44	0.71	0.31	48.67	3.88	76.22	0.07
3	22.44	0.71	0.31	48.67	3.88	76.22	0.07

4	28.44	0.72	0.30	51.70	3.93	96.60	0.05
DECK NO.	2						
SEG							
1	22.44	0.71	0.31	48.67	3.88	76.22	0.07
2	22.44	0.71	0.31	48.67	3.88	76.22	0.07
3	22.81	1.04	0.45	83.34	6.66	77.48	0.09

STRESS AND FACTOR OF SAFETY

	-STRESS, KSI- BENDING	SHEAR	------FOS----- BENDING	SHEAR
WET DECK				
SEG				
1	35.07	11.76	1.08	1.94
2	35.07	11.76	1.08	1.94
3	35.07	11.76	1.08	1.94
4	35.07	11.76	1.08	1.94
DECK NO. 1				
SEG				
1	21.90	6.74	1.74	3.38
2	21.90	6.74	1.74	3.38
3	21.90	6.74	1.74	3.38
4	13.52	5.36	2.81	4.25
DECK NO. 2				
SEG				
1	21.90	6.74	1.74	3.38
2	21.90	6.74	1.74	3.38
3	31.93	7.27	1.19	3.14

PRINTED REPORT NO. 15 - LONGITUDINAL BULKHEAD VERTICAL STIFFENERS

NUMBER OF LONG BHD 0

ASSET/MONOSC VERSION 3.3+ - APPENDAGE MODULE - 2/11/95 10.47.01.

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** WARNING - APPENDAGE MODULE ** (W-FINROTATSHIFT-FINREP)
FWD FINS HAVE BEEN RE-POSITIONED BY SHIFTING FIN ROOT
Z-COORD.   -0.74 FT (UPWARD POSITIVE) AND BY ROTATING
ABOUT FIN ROOT    10.00 DEG (CLOCKWISE POSITIVE).
** WARNING - APPENDAGE MODULE ** (W-FINSPANRESIZE-FINRES)
FWD FINS HAVE BEEN RESIZED:
    CHANGE IN CHORD            0.44 FT
    CHANGE IN THK              0.07 FT
    CHANGE IN SPAN            -0.42 FT
    CHANGE IN AREA             0.00 FT2
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PRINTED REPORT NO. 1 - SUMMARY

APPENDAGE DISP, LTON	87.6
SHELL DISP, LTON	15.0

SKEG IND	PRESENT	RUDDER TYPE IND	SPADE
SKEG DISP, LTON	9.9	NO RUDDERS	2
SKEG AFT LIMIT/LBP	0.8591	AVG RUDDER CHORD, FT	9.93
SKEG THK, FT	1.00	RUDDER THK, FT	1.11
SKEG PROJECTED AREA, FT2	346.4	RUDDER SPAN, FT	12.08
		RUDDER PROJECTED AREA, FT2	120.0
BILGE KEEL IND	PRESENT	RUDDER DISP, LTON	5.1
BILGE KEEL DISP, LTON	5.8		
BILGE KEEL LGTH, FT	89.78	FIN SIZE IND	CALC
		NO FIN PAIRS	1
SHAFT SUPPORT TYPE IND	POD	FWD FIN	
SHAFT SUPPORT DISP, LTON	44.6	CHORD, FT	10.64
SHAFT DISP, LTON	0.0	THK, FT	1.60
		SPAN, FT	9.79
PROP TYPE IND	FP	PROJECTED AREA, FT2	104.2
PROP BLADE DISP, LTON	0.8	DISP, LTON (PER PAIR)	6.3
NO PROP SHAFTS	2	AFT FIN	
PROP DIA, FT	11.67	CHORD, FT	
		THK, FT	
SONAR DOME IND	NONE	SPAN, FT	
SONAR DISP, LTON	0.0	PROJECTED AREA, FT2	
		DISP, LTON (PER PAIR)	

PRINTED REPORT NO. 2 - APPENDAGE BUOYANCY AND WEIGHT

APPENDAGE	DISP, LTON	CENTER OF BUOYANCY X, FT	Y, FT	Z, FT
SHELL	15.0	195.70	0.00	9.65
SKEG	9.9	295.83	0.00	2.54
BILGE KEELS*	5.8	147.25	18.12	6.22
PODS*	44.6	354.70	8.30	3.88
PROP BLADES*	0.8	345.45	8.30	2.19
RUDDERS*	5.1	372.88	8.30	7.00
ROLL FIN PAIR*	6.3	209.00	21.80	0.83
TOTAL, LTON	87.6			

* TRANSVERSE C.B. PER SIDE IS SHOWN

SWBS114, SHLL APNDG, LTON 17.24 SWBS565, ROLL FINS, LTON 36.46

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 2/11/95 10.47.12.

PRINTED REPORT NO. 1 - SUMMARY

RESID RESIST IND	NRC	BILGE KEEL IND	PRESENT
FRICTION LINE IND	ITTC	SHAFT SUPPORT TYPE IND	POD
ENDUR DISP IND	AVG DISP	PRPLN SYS RESIST IND	CALC
ENDUR CONFIG IND	NO TS	PROP TYPE IND	FP
SONAR DRAG IND		SONAR DOME IND	NONE
SKEG IND	PRESENT	RUDDER TYPE IND	SPADE
FULL LOAD WT, LTON	3980.1	CORR ALW	0.00050
AVG ENDUR DISP, LTON	3810.6	DRAG MARGIN FAC	0.080
USABLE FUEL WT, LTON	394.3	TRAILSHAFT PWR FAC	
NO RUDDERS	2.		
NO FIN PAIRS	1.	PRPLN SYS RESIST FRAC	
PROP TIP CLEAR RATIO	0.25	MAX SPEED	0.186
NO PROP SHAFTS	2.	SUSTN SPEED	0.207
PROP DIA, FT	11.67	ENDUR SPEED	0.408

CONDITION	SPEED KT	EFFECTIVE HORSEPOWER, HP FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
MAX	26.05	5812.	8365.	4156.	214.	1484.	20032.	250565.
SUSTN	25.00	5156.	6074.	3623.	189.	1203.	16245.	211746.
ENDUR	14.00	939.	416.	773.	34.	173.	2334.	54319.

PRINTED REPORT NO. 2 - SPEED-POWER MATRIX

RESID RESIST IND NRC
ENDUR DISP IND AVG DISP

SPEED AND POWER FOR FULL LOAD DISP

FULL LOAD WT, LTON 3980.1

SPEED KT	EFFECTIVE HORSEPOWER, HP FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
2.00	3.	0.	7.	0.	1.	12.	1882.
4.00	25.	3.	36.	1.	5.	71.	5778.
6.00	82.	18.	96.	3.	16.	214.	11627.
8.00	189.	56.	194.	6.	36.	480.	19565.
10.00	360.	136.	338.	12.	68.	914.	29771.
12.00	611.	281.	534.	21.	116.	1563.	42443.
14.00	956.	427.	777.	33.	175.	2369.	55140.
16.00	1409.	554.	1070.	50.	247.	3329.	67805.
18.00	1984.	973.	1452.	71.	358.	4838.	87586.
20.00	2695.	1596.	1914.	97.	504.	6806.	110889.
22.00	3555.	2478.	2464.	129.	690.	9315.	137979.
24.00	4578.	4461.	3183.	167.	991.	13380.	181674.
26.00	5779.	8236.	4128.	213.	1468.	19824.	248465.
28.00	7169.	15862.	5473.	266.	2302.	31071.	361607.

SPEED AND POWER FOR AVE ENDUR DISP

AVE ENDUR DISP, LTON 3810.6

SPEED KT	FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
	EFFECTIVE HORSEPOWER, HP						
2.00	3.	0.	7.	0.	1.	11.	1866.
4.00	25.	3.	36.	1.	5.	70.	5726.
6.00	80.	18.	96.	3.	16.	212.	11518.
8.00	185.	55.	194.	6.	35.	476.	19379.
10.00	354.	135.	337.	12.	67.	905.	29488.
12.00	600.	280.	532.	21.	115.	1548.	42042.
14.00	939.	416.	773.	34.	173.	2334.	54319.
16.00	1383.	503.	1061.	50.	240.	3236.	65916.
18.00	1947.	838.	1433.	72.	343.	4634.	83887.
20.00	2645.	1377.	1886.	98.	481.	6487.	105698.
22.00	3489.	2208.	2430.	131.	661.	8918.	132099.
24.00	4494.	4033.	3134.	170.	946.	12777.	173479.
26.00	5672.	7582.	4058.	216.	1402.	18929.	237243.
28.00	7036.	15019.	5386.	269.	2217.	29927.	348298.

PRINTED REPORT NO. 3 - SHIP GEOMETRIC DATA FOR RESISTANCE COMPUTATIONS

RESID RESIST IND NRC
ENDUR DISP IND AVG DISP

	FULL LOAD	AVE ENDUR DISP
BARE HULL DISP, LTON	3892.6	3723.0
APPENDAGE DISP, LTON	87.5	87.5
TOTAL DISP, LTON	3980.1	3810.6
LBP, FT	380.00	380.00
WL LENGTH, FT	380.00	379.80
BEAM AT MAX AREA STA, FT	51.00	50.94
DRAFT AT MAX AREA STA, FT	15.50	15.08
TAYLOR WETTED SURF AREA, FT2	19631.6	19344.8
SHIP WETTED SURF AREA, FT2	19631.6	19344.8
SKEG WETTED SURF AREA, FT2	692.9	692.9
WIND FRONT AREA, FT2	1664.3	1685.6
FROUDE WETTED SURF COEF	7.2061	7.2858
LENGTH-BEAM RATIO	7.4510	7.4555
BEAM-DRAFT RATIO	3.2906	3.3781
PRISMATIC COEF	0.5699	0.5645
MAX SECTION COEF	0.7953	0.7905
DISP-LENGTH RATIO	70.9400	67.9538
LCB-LENGTH RATIO	0.5036	0.5007
HALF ANG ENTRANCE, DEG	8.74	8.54
HALF ANG RUN, DEG	5.94	9.65
TRANSOM BUTTOCK ANG, DEG	5.93	5.93
BOW SECT AREA COEF	0.0000	0.0000
TRANSOM SECT AREA COEF	0.0412	0.0219
TRANSOM BREADTH COEF	0.6135	0.5451
TRANSOM DEPTH COEF	0.0763	0.0507

PRINTED REPORT NO. 4 - APPENDAGE DATA

SKEG IND	PRESENT
SKEG AREA, FT2	346.4
BILGE KEEL IND	PRESENT
SHAFT SUPPORT TYPE IND	POD
POD STRUT CHORD LGTH, FT	8.57
POD STRUT THICKNESS, FT	2.48
POD BARREL LGTH, FT	24.50
POD BARREL DIA, FT	7.43
POD STRUT TE OFFSET, FT	7.56
NO PROP SHAFTS	2.
WET SHAFT LGTH (PORT), FT	0.00
WET SHAFT LGTH (STBD), FT	0.00
INTRMDT SHAFT DIA, FT	
PROP TYPE IND	FP
PROP DIA, FT	11.67
SONAR DOME IND	NONE
SONAR DRAG IND	
SONAR SECT AREA, FT2	
NO RUDDERS	2.
RUDDER AREA, FT2	120.0
NO FIN PAIRS	1.
ROLL FIN AREA, FT2	208.4

ASSET/MONOSC VERSION 3.3+ - PROPELLER MODULE - 2/11/95 10.47.26.

PRINTED REPORT NO. 1 - SUMMARY

ENDUR CONFIG IND	NO TS		
PROP TYPE IND	FP	PROP SERIES IND	ANALYTIC
PROP DIA IND	CALC	PROP LOC IND	CALC
PROP AREA IND	CALC	PROP ID IND	
SHAFT SUPPORT TYPE IND	POD	RUDDER TYPE IND	SPADE
MAX SPEED, KT	26.05	ENDUR SPEED, KT	14.00
MAX EHP (/SHAFT), HP	10016.	ENDUR EHP (/SHAFT), HP	1167.
MAX SHP (/SHAFT), HP	14388.	ENDUR SHP (/SHAFT), HP	1619.
MAX PROP RPM	220.0	ENDUR PROP RPM	110.3
MAX PROP EFF	0.696	ENDUR PROP EFF	0.721
SUSTN SPEED, KT	25.00	PROP DIA, FT	11.67
SUSTN EHP (/SHAFT), HP	8122.	NO BLADES	7.
SUSTN SHP (/SHAFT), HP	11529.	PITCH RATIO	1.26
SUSTN PROP RPM	206.6	EXPAND AREA RATIO	0.905
SUSTN PROP EFF	0.705	CAVITATION NO	1.71
NO PROP SHAFTS	2.0		
TOTAL PROPELLER WT, LTON	13.97		

PRINTED REPORT NO. 2 - PROPELLER CHARACTERISTICS

PROP ID IND	
NO PROP SHAFTS	2.
PROP DIA, FT	11.67
NO BLADES	7.
PITCH RATIO	1.26
EXPAND AREA RATIO	0.905
THRUST DED COEF	0.050
TAYLOR WAKE FRAC	0.050
HULL EFFICIENCY	1.000
REL ROTATE EFF	1.000

CHARACTERISTICS	CONDITIONS MAXIMUM	SUSTAINED	ENDURANCE
SPEED, KT	26.05	25.00	14.00
RPM	220.0	206.6	110.3
THRUST/SHAFT, LBF	131878.	111446.	28589.
EHP/SHAFT, HP	10016.	8122.	1167.
TORQUE/SHAFT, FT-LBF	343480.	293081.	77103.
SHP/SHAFT, HP	14388.	11529.	1619.
ADVANCE COEF (J)	0.976	0.997	1.046
THRUST COEF (KT)	0.265	0.254	0.229
TORQUE COEF (10KQ)	0.592	0.573	0.529
OPEN WATER EFFY	0.696	0.705	0.721
PC	0.696	0.705	0.721

PRINTED REPORT NO. 3 - CAVITATION CHARACTERISTICS

MAX SPEED OF ADV, KT	24.75
MAX THRUST, LBF	131878.
MAX PROP RPM	220.0
PROP DIA, FT	11.67
HUB DEPTH, FT	13.31
STD CAV NO	1.71
LOCAL CAV NO (.7R)	0.28
MEAN THRUST LOADING COEF	0.17
EXPAND AREA RATIO	0.905
MIN EAR REQUIRED	0.905
BACK CAV ALLOWED, PERCENT	10.0

PRINTED REPORT NO. 4 - PROPELLER ARRANGEMENT

PROP DIA, FT	11.67
FULL LOAD DRAFT, FT	15.50
HUB DEPTH FROM DWL, FT	13.31
LONG LOC FROM AP, FT	34.55
HUB POS FROM CL, FT	8.30
TIP CLR FROM BL, FT	-3.65
TIP CLR FROM MAX HB, FT	13.30
TIP CLR FROM HULL BOT, FT	2.77
TOTAL PROPELLER WT, LTON	13.97

ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 2/11/95 10.47.57.

** WARNING - MACHINERY MODULE ** (W-TORQGOVRNSHDIA-SHSIZN)
PROPELLER SHAFT DIAMETER IS GOVERNED BY TORQUE.
** WARNING - MACHINERY MODULE ** (W-MRDIM2SMALL-MRDIMR)
DIMENSIONS OF THE FOLLOWING MACHINERY ROOMS ARE TOO SMALL
TO ENCLOSE MACHINERY : 2
** WARNING - MACHINERY MODULE ** (W-LT1ENGPERSHAFTE-MHYMSG)
LESS THAN ONE PROPULSION ENGINE PER PROPELLER SHAFT IS OPERATING
AT ENDURANCE (DUE TO SELECTION OF VALUES WITHIN THE PARAMETER
ELECT PG ARR OP ARRAY). THIS IS NOT CURRENT STANDARD NAVAL PRACTICE.
** WARNING - MACHINERY MODULE ** (W-TOTALSSGENLT3-MHYMSG)
TOTAL NUMBER OF SHIP SERVICE GENERATORS (INCLUDING VSCF, IF ANY),
IS LESS THAN THREE.
** WARNING - MACHINERY MODULE ** (W-ZEROSBYSSGEN-MHYMSG)
NO STANDBY SHIP-SERVICE GENERATORS EXIST AT BATTLE ELECTRICAL
LOADING CONDITION.
** WARNING - MACHINERY MODULE ** (W-OPSSGENENDURLT2-MHYMSG)
NUMBER OF SHIP SERVICE GENERATORS OPERATING AT ENDURANCE CONDITION IS
LESS THAN TWO.

PRINTED REPORT NO. 1 - SUMMARY

TRANS TYPE IND	ELECT	MAX SPEED, KT	26.05

ELECT PRPLN TYPE IND	ACR-DCS	SUSTN SPEED IND	GIVEN
SHAFT SUPPORT TYPE IND	POD	SUSTN SPEED, KT	25.00
NO PROP SHAFTS	2.	ENDUR SPEED IND	GIVEN
ENDUR CONFIG IND	NO TS	ENDUR SPEED, KT	14.00
SEC ENG USAGE IND		DESIGN MODE IND	ENDURANCE
MAX MARG ELECT LOAD, KW	2755.	ENDURANCE, NM	6000.
AVG 24 HR ELECT LOAD, KW	1142.	USABLE FUEL WT, LTON	394.3
SWBS 200 GROUP WT, LTON	281.3	SUSTN SPEED POWER FRAC	0.80
SWBS 300 GROUP WT, LTON	261.7		

ARRANGEMENT OR SS GEN	TYPE	NO INSTALLED	NO ONLINE MAX+SUSTN	NO ONLINE ENDURANCE
ELECT PG ARR 1 IND	M-PG	2	2	1
ELECT PG ARR 2 IND		0	0	0
ELECT DL ARR IND	MTR	2	2	2
SEP SS GEN	2868. KW	2	2	1
VSCF SS CYCLO	KW	0	0	0

	MAIN ENG	SEC ENG	SS ENG
ENG SELECT IND	GIVEN		GIVEN
ENG MODEL IND	GE-LM1600-VAN2		A-12V270
ENG TYPE IND	RGT		D DIESEL
ENG SIZE IND	CALC		CALC
NO INSTALLED	2	0	2
ENG PWR AVAIL, HP	15902.		4002.
ENG RPM	4522.4		900.0
ENG SFC, LBM/HP-HR	0.345		.336
ENG LOAD FRAC	1.000		1.000

PRINTED REPORT NO. 2 - MACHINERY EQUIPMENT LIST

NO EACH	ITEM	WEIGHT LTON	LENGTH FT	WIDTH FT	HEIGHT FT
	PROPULSION PLANT				
2	MAIN ENGINE (BARE)	1.6	9.55	4.46	4.46
2	MAIN ENGINE ENCLOSURE MODULE	8.1	18.91	7.96	7.26
2	MAIN ENGINE INTERCOOLER	2.1	4.48	5.05	5.05
0	SEC ENGINE (BARE)				
0	SEC ENGINE ENCLOSURE MODULE				
0	SEC ENGINE INTERCOOLER				
0	RACER STEAM TURBINE				
0	RACER CONDENSER				
0	LTDR GEAR (01)				
0	EPIC REV PINION GEAR (02)				
0	FRANCO TOSI REV GEAR (03)				
0	VSCF COMB/STEP-UP GEAR (04)				
0	RACER REDUCTION GEAR (05)				
0	2 SPD SOLAR EPIC GEAR (06)				
0	OFFSET GEAR (07)				
0	OFFSET COMB (2-1) GEAR (08)				
0	OFFSET COMB (3-2) GEAR (09)				
0	CR EPIC GEAR (10)				
0	Z DRIVE SPIRAL BVL GEAR (11)				
0	PLANETARY REDUCTION GEAR(12)				
0	CR BI-COUPLED EPIC GEAR (13)				
0	STAR EPIC REV GEAR (14)				
0	STAR EPIC REDUCTION GEAR(15)				
0	COMBINING STEP-UP GEAR (16)				
2	PROPULSION GENERATOR	13.7	13.60	5.42	5.42
2	PROPULSION MOTOR	14.4	8.58	4.49	4.49
2	THRUST BEARING	3.0	2.45	3.42	3.42
2	PROPELLER SHAFT				
	ELECTRIC PLANT				
2	SS ENGINE (BARE)	22.4	16.64	6.34	8.01
0	SS ENGINE ENCLOSURE MODULE				
0	SS REDUCTION GEAR (17)				
2	SEPARATE SS GENERATOR	12.5	7.14	5.09	6.59
0	VSCF SS GENERATOR				
0	VSCF SS CYCLOCONVERTER				

PRINTED REPORT NO. 3 - ENGINES

	MAIN ENG	SEC ENG	SS ENG
ENG SELECT IND	GIVEN		GIVEN
ENG TYPE IND	RGT		D DIESEL
ENG MODEL IND	GE-LM1600-VAN2		A-12V270
ENG SIZE IND	CALC		CALC
NO INSTALLED	2	0	2
ENG BARE WT, LTON	1.6		22.4
ENG LENGTH, FT	9.55		16.64
ENG WIDTH, FT	4.46		6.34
ENG HEIGHT, FT	4.46		8.01
ENG PWR AVAIL, HP	15902.		4002.1
ENG RPM	4522.4		900.0
ENG MASS FL, LBM/SEC	74.2		13.7
ENG EXH TEMP, DEGF	676.6		818.9
ENG SFC EQN IND	POLY QN		DIESEL
ENG SFC, LBM/HP-HR	0.345		.336
MAX SPEED CONDITION			
NO OPERATING	2	0	2
ENG PWR, HP	15902.		1922.2
ENG RPM	4522.4		900.0
ENG MASS FL, LBM/SEC	74.2		10.3
ENG EXH TEMP, DEGF	676.6		677.6
ENG SFC, LBM/HP-HR	.345		.337
SUSTN SPEED CONDITION			
NO OPERATING	2	0	2
ENG PWR, HP	12721.		1922.2
ENG RPM	4247.1		900.0
ENG MASS FL, LBM/SEC	68.1		10.3
ENG EXH TEMP, DEGF	620.4		677.6
ENG SFC, LBM/HP-HR	.334		.337
ENDUR SPEED CONDITION			
ENG ENDUR RPM IND	CALC		
NO OPERATING	1	0	1
ENG PWR, HP	3897.		1593.5
ENG RPM	4522.4		900.0
ENG MASS FL, LBM/SEC	43.2		9.6
ENG EXH TEMP, DEGF	497.9		658.5
ENG SFC, LBM/HP-HR	.342		.343

NOTE - ENGINE OPERATING DATA ARE BASED ON USE OF DFM FUEL.

PRINTED REPORT NO. 4 - GEARS

NO EACH	ITEM	WEIGHT LTON	LENGTH FT	WIDTH FT	HEIGHT FT
	2-STAGE REDUCTION GEARS				
0	LTDR GEAR (01)				
0	CR BI-COUPLED EPIC GEAR (13)				
	1ST STAGE REDUCTION GEARS				
0	OFFSET GEAR (07)				
0	OFFSET COMB (2-1) GEAR (08)				
0	OFFSET COMB (3-2) GEAR (09)				
0	STAR EPIC REDUCTION GEAR(15)				
	2ND STAGE REDUCTION GEARS				
0	CR EPIC GEAR (10)				
0	PLANETARY REDUCTION GEAR(12)				
	SPECIAL GEARS				
0	EPIC REV PINION GEAR (02)				
0	FRANCO TOSI REV GEAR (03)				
0	VSCF COMB/STEP-UP GEAR (04)				
0	RACER REDUCTION GEAR (05)				
0	2 SPD SOLAR EPIC GEAR (06)				
0	Z DRIVE SPIRAL BVL GEAR (11)				
0	STAR EPIC REV GEAR (14)				
0	COMBINING STEP-UP GEAR (16)				
0	SS REDUCTION GEAR (17)				

REDUCTION GEAR DESIGN FACTORS AND DIMENSIONS	1ST STAGE	2ND STAGE	SS
REDUCTION RATIO			

K FACTOR
FACE WIDTH RATIO
CASING WT FACTOR

GEAR FACE WIDTH, FT
PINION GEAR DIA, FT
REDUCTION GEAR DIA, FT
SUN GEAR DIA, FT
PLANET GEAR DIA, FT
RING GEAR DIA, FT
RING GEAR THK, FT
NO PLANETS

PRINTED REPORT NO. 5 - ELECTRIC PROPULSION AND VSCF EQUIPMENT

TRANS TYPE IND-ELECT
ELECT PRPLN TYPE IND-ACR-DCS
SWITCHGEAR TYPE IND-ADV
TRANS LINE NODE PT IND-CALC
ELECT PRPLN RATING IND-CALC

TRANS LINE NODE PT X, FT	258.20
TRANS LINE NODE PT Y, FT	-6.17
TRANS LINE NODE PT Z, FT	15.00

MOTORS AND GENERATORS

	PRPLN GENERATOR	PRPLN MOTOR	VSCF GENERATOR
INSTALLED NUMBER	2	2	0
TYPE	AC	DCS	
FREQUENCY CONTROL	NO		
DRIVE		DIRECT	
ROTOR COOLING	AIR	LIQUID	
ROTOR TIP SPEED, FT/MIN	28500.		
STATOR COOLING	LIQUID	LIQUID	
ARM ELECT LOAD, AMP/IN	2400.		
POWER RATING, MW	14.94	10.73	
ROTATIONAL SPEED, RPM	4522.	220.	
NUMBER OF POLES	4.	6.	
LENGTH, FT	13.6	8.6	
WIDTH, FT	5.4	4.5	
HEIGHT, FT	5.4	4.5	
WEIGHT, LTON	13.7	14.4	

OTHER ELECTRIC PROPULSION AND VSCF EQUIPMENT

	WEIGHT LTON
CONTROLS	1.4
BRAKING RESISTORS	2.1
EXCITERS	7.4
SWITCHGEAR	1.5
POWER CONVERTERS	.0
DEIONIZED COOL WATER SYS	13.4
PRPLN TRANS LINE	36.9
RECTIFIERS	3.8
HELIUM REFRIGERATION SYS	4.6
VSCF CYCLOCONVERTERS	.0

PRINTED REPORT NO. 6 - SHIP SERVICE GENERATORS

SS SYS TYPE IND-SEP
GEN SIZE IND-NON STD

ELECT LOAD DES MARGIN FAC	0.200
ELECT LOAD SL MARGIN FAC	0.100
ELECT LOAD IMBAL FAC	0.900
MAX MARG ELECT LOAD, KW	2754.9
MAX STANDBY LOAD, KW	1627.5
24 HR AVG ELECT LOAD, KW	1141.9

VSCF SS CYCLOCONVERTERS

CONDITION	NO INSTALL	NO ONLINE	REQ KW/CYCLO	AVAIL KW/CYCLO	LOADING FRAC
WINTER BATTLE	0	0			0.000
WINTER CRUISE	0	0			0.000
SUMMER CRUISE	0	0			0.000
ENDURANCE(24 HR AVG)	0	0			0.000

SEPARATE SS GENERATORS

CONDITION	NO INSTALL	NO ONLINE	REQ KW/GEN	AVAIL KW/GEN	LOADING FRAC
WINTER BATTLE	2	2	1377.	2868.	0.480
WINTER CRUISE	2	1	2581.	2868.	0.900
SUMMER CRUISE	2	1	1899.	2868.	0.662
ENDURANCE(24 HR AVG)	2	1	1142.	2868.	0.398

TOTALS

CONDITION	REQ KW	AVAIL KW	LOADING FRAC
WINTER BATTLE	2755.	5736.	0.480
WINTER CRUISE	2581.	2868.	0.900
SUMMER CRUISE	1899.	2868.	0.662
ENDURANCE(24 HR AVG)	1142.	2868.	0.398

PRINTED REPORT NO. 7 - INTAKE DUCTS

INLET TYPE IND-PLENUM
DUCT SILENCING IND-BOTH
GT ENG ENCL IND-84 DBA

	MAIN ENG	SEC ENG	SS ENG
ENG TYPE	RGT		D DIESEL
INLET DUCT XSECT AREA,FT2	54.5	.0	.0
INLET DUCT XSECT LTH, FT	6.85	.0	.0
INLET DUCT XSECT WID, FT	7.96	.0	.0

MMR1

	MAIN ENG WT,LTON	MAIN ENG VCG,FT	SEC ENG WT,LTON	SEC ENG VCG,FT
INLET	0.5	37.05		
INLET DUCTING	0.8	29.84		
INLET SILENCER	1.1	35.67		
GT COOLING SUPPLY	0.8	24.64		
GT BLEED AIR SUPPLY	2.1	21.77		

MMR2

	MAIN ENG WT,LTON	MAIN ENG VCG,FT	SEC ENG WT,LTON	SEC ENG VCG,FT
INLET	0.5	35.28		
INLET DUCTING	0.7	28.95		
INLET SILENCER	1.1	35.67		
GT COOLING SUPPLY	0.7	23.98		
GT BLEED AIR SUPPLY	2.1	21.31		

NOTE - NUMERIC DATA PRESENTED ABOVE ARE ON A PER ENGINE BASIS.

TRUNK AREA AND VOLUME REQUIREMENTS

ENGINE CATEGORY	AREA,FT2 HULL	AREA,FT2 DKHS	VOLUME,FT3 HULL	VOLUME,FT3 DKHS
MAIN ENGINES	138.6	138.6	1386.	1383.
SECONDARY ENGINES	0.0	0.0	0.	0.
SHIP-SERVICE ENGINES	0.0	0.0	0.	0.
TOTALS	138.6	138.6	1386.	1383.

PRINTED REPORT NO. 8 - EXHAUST DUCTS

EXHAUST IR SUPPRESS IND-PRESENT
DUCT SILENCING IND-BOTH GT ENG ENCL IND-84 DBA

EXHAUST STACK TEMP, DEGF 350.0 EDUCTOR DESIGN FAC 1.000

	MAIN ENG	SEC ENG	SS ENG
ENG TYPE	RGT		D DIESEL
ENG EXH TEMP, DEG	677.		819.
ENG MASS FL, LBM/SEC	74.2		13.7
EXH DUCT GAS TEMP, DEG	609.		819.
EXH DUCT GAS DEN, LBM/FT3	0.0366		.0306
EXH DUCT MASS FL, LBM/SEC	84.6		13.7
EXH DUCT AREA, FT2	21.5		4.2

MMR1

	MAIN ENG WT,LTON	MAIN ENG VCG,FT	SEC ENG WT,LTON	SEC ENG VCG,FT
EXH DUCT (TO BOILER/REG)				
EXH BOILER (RACER)				
EXH REGENERATOR	11.5	22.42		
EXH DUCT (TO STACK)	1.9	33.63		
EXH SILENCER	3.1	38.56		
EXH STACK	1.1	47.35		
EXH SPRAY RING	.6	32.45		
EXH EDUCTOR	1.7	45.91		

MMR2

	MAIN ENG WT,LTON	MAIN ENG VCG,FT	SEC ENG WT,LTON	SEC ENG VCG,FT
EXH DUCT (TO BOILER/REG)				
EXH BOILER (RACER)				
EXH REGENERATOR	11.5	22.42		
EXH DUCT (TO STACK)	1.7	32.75		
EXH SILENCER	3.1	38.56		
EXH STACK	1.1	45.58		
EXH SPRAY RING	.6	31.27		
EXH EDUCTOR	1.7	44.14		

NOTE - NUMERIC DATA PRESENTED ABOVE ARE ON A PER ENGINE BASIS.

TRUNK AREA AND VOLUME REQUIREMENTS

ENGINE CATEGORY	-----AREA,FT2---- HULL	DKHS	---VOLUME,FT3---- HULL	DKHS
MAIN ENGINES	342.6	182.1	3426.	1817.
SECONDARY ENGINES	0.0	0.0	0.	0.
SHIP-SERVICE ENGINES	69.6	69.6	696.	693.
TOTALS	412.3	251.8	4123.	2510.

PRINTED REPORT NO. 9 - PROPELLERS AND SHAFTS

SHAFT SUPPORT TYPE IND-POD
SHAFT SYS SIZE IND-CALC
PROP TYPE IND-FP

PROP DIA, FT	11.67
HUB DIA, FT	4.91
PROP BLADE WT, LTON	3.2
PROP HUB WT, LTON	3.8
BEND STRESS CON FAC	1.000
OVRHG PROP MOM ARM RATIO	0.340
EQUIV FP PROP WT, LTON	7.0
ALLOW BEND STRESS, LBF/IN2	6000.
FATIGUE LIMIT, LBF/IN2	47500.
YIELD POINT, LBF/IN2	75000.
TORQUE MARGIN FAC	1.200
OFF-CENTER THRUST FAC	1.000
NO STRUTS PER SHAFT	0

PORT SHAFT

	PROP SECTION	INTERMED SECTION	LINE SECTION
ANGLE, DEG	-5.81		
LENGTH, FT	2.92		
DIAMETER, FT	1.22		
BORE RATIO	.550		
WEIGHT, LTON	.7		
LCG, FT	348.06		
TCG, FT	-8.30		
VCG, FT	2.45		
FACTOR OF SAFETY			

STBD SHAFT

	PROP SECTION	INTERMED SECTION	LINE SECTION
ANGLE, DEG	-5.81		
LENGTH, FT	2.92		
DIAMETER, FT	1.22		
BORE RATIO	.550		
WEIGHT, LTON	.7		
LCG, FT	348.06		
TCG, FT	8.30		
VCG, FT	2.45		
FACTOR OF SAFETY			

PRINTED REPORT NO. 10 - STRUTS, PODS, AND RUDDERS

SHAFT SUPPORT TYPE IND-POD
SHAFT SYS SIZE IND-CALC

PROP DIA, FT	11.67
NO STRUTS PER SHAFT	0
NO SHAFTS	2
OVRHG PROP MOM ARM RATIO	0.340

PODS

STRUT WALL THICKNESS, FT	.05
STRUT CHORD, FT	8.57
STRUT THICKNESS, FT	2.48
BARREL LTH, FT	24.50
BARREL DIA, FT	7.43

RUDDERS

RUDDER TYPE IND-SPADE
RUDDER SIZE IND-CALC

NO RUDDERS	2.
RUDDER WT (PER), LTON	13.7
RUDDER DISP (PER), LTON	2.5

	CHORD,FT	THICK,FT	SPAN,FT
SPADE RUDDER	9.93	1.11	12.08

PRINTED REPORT NO. 11 - ELECTRIC LOADS

400 HZ ELECT LOAD FAC 0.200

PAYLOAD LOADS	WINTER CRUISE KW	WINTER BATTLE KW	SUMMER CRUISE KW
COMMAND AND SURVEILLANCE (60 HZ)	106.9	464.8	106.9
COMMAND AND SURVEILLANCE (400 HZ)	26.7	116.2	26.7
ARMAMENT (60 HZ)	35.2	122.4	39.2
ARMAMENT (400 HZ)	8.8	30.6	9.8
OTHER PAYLOAD (60 HZ)	0.0	0.0	0.0
OTHER PAYLOAD (400 HZ)	0.0	0.0	0.0
SUB-TOTAL	177.6	734.0	182.6
NON-PAYLOAD LOADS (* INDICATES USER ADJUSTED VALUE)			
PROPULSION AND STEERING	262.6	291.8	198.7
LIGHTING	102.4	100.3	102.4
MISCELLANEOUS ELECTRIC	46.1	40.1	46.1
HEATING	605.3	308.7	30.3
VENTILATION	245.2	188.8	245.2
AIR CONDITIONING	225.4	211.8	336.4
AUXILIARY BOILER AND FRESH WATER	114.7	84.9	114.7
FIREMAIN	49.9	70.3	49.9
UNREP AND HANDLING	7.8	12.9*	7.8
MISC AUXILIARY MACHINERY	99.8	55.9	99.8
SERVICES AND WORK SPACES	42.7	14.1	42.7
SUBTOTAL	1801.7	1379.6	1273.8
TOTAL	1979.3	2113.6	1456.4
TOTAL (INCLUDING MARGINS)	2581.2	2754.9	1898.6

MAX MARG ELECT LOAD	2754.9
24 HR AVG ELECT LOAD	1141.9
CONNECTED ELECT LOAD	5601.1
ANCHOR ELECT LOAD	1627.5
VITAL ELECT LOAD	1049.4
EMERGENCY ELECT LOAD	675.8
MAX STBY ELECT LOAD	1627.5

PRINTED REPORT NO. 12 - POWERING

SUSTN SPEED IND-GIVEN
ENDUR SPEED IND-GIVEN
TRANS EFF IND-CALC

100 PCT POWER TRANS EFF	0.9048
25 PCT POWER TRANS EFF	0.9141

	MAX SPEED	SUSTN SPEED	ENDUR SPEED
SHIP SPEED, KT	26.05	25.00	14.00
PROP RPM	220.0	206.6	110.3
NO OP PROP SHAFTS	2	2	2
EHP (/SHAFT), HP	10016.	8122.	1167.
PROPULSIVE COEF	0.696	0.705	0.721
ENDUR PWR ALW	1.0	1.0	1.1
SHP (/SHAFT), HP	14387.	11529.	1781.
TRANS EFFY	0.905	0.906	0.914
CP PROP TRANS EFFY MULT	1.000	1.000	1.000
PROPUL PWR (/SHAFT), HP	15902.	12721.	1948.
PD GEN PWR (/SHAFT), HP	0.	0.	0.
BHP (/SHAFT), HP	15902.	12721.	1948.

PRINTED REPORT NO. 13 - HULL STRUCTURE AND MISCELLANEOUS WEIGHT

SWBS	COMPONENT	WT,LTON	LCG,FT	VCG,FT
160	SPECIAL STRUCTURES			
161	CASTINGS, FORGINGS, AND WELDMENTS	33.1	268.42	9.19
162	STACKS AND MASTS	2.1	202.03	46.46
180	FOUNDATIONS			
182	PROPULSION PLANT FOUNDATIONS	93.2	249.31	7.48
183	ELECTRIC PLANT FOUNDATIONS	45.8	194.49	12.82

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 14 - PROPULSION PLANT WEIGHT

SWBS	COMPONENT	WT,LTON	LCG,FT	VCG,FT
200	PROPULSION PLANT	281.3	246.35	13.45
210	ENERGY GENERATING SYSTEM (NUCLEAR)	0.0	0.00	0.00
220	ENERGY GENERATING SYSTEM (NON-NUCLEAR)	0.0	0.00	0.00
230	PROPULSION UNITS	186.8	253.04	12.19
233	PROPULSION INTERNAL COMBUSTION ENGINES	0.0	0.00	0.00
234	PROPULSION GAS TURBINES	60.8	195.96	17.38
235	ELECTRIC PROPULSION	126.0	280.58	9.68
240	TRANSMISSION AND PROPULSOR SYSTEMS	21.7	347.13	2.36
241	PROPULSION REDUCTION GEARS	0.0	0.00	0.00
242	PROPULSION CLUTCHES AND COUPLINGS	0.0	0.00	0.00
243	PROPULSION SHAFTING	1.4	348.06	2.45
244	PROPULSION SHAFT BEARINGS	6.3	350.62	2.71
245	PROPULSORS	14.0	345.45	2.19
250	PRPLN SUPPORT SYS (EXCEPT FUEL+LUBE OIL)	36.6	198.61	28.42
251	COMBUSTION AIR SYSTEM	10.5	187.34	27.43
252	PROPULSION CONTROL SYSTEM	9.4	195.96	19.50
256	CIRCULATING AND COOLING SEA WATER SYSTEM	2.6	239.40	10.80
259	UPTAKES (INNER CASING)	14.2	201.28	38.18
260	PRPLN SUPPORT SYS (FUEL+LUBE OIL)	23.7	187.73	12.44
261	FUEL SERVICE SYSTEM	9.4	176.96	11.38
262	MAIN PROPULSION LUBE OIL SYSTEM	10.2	195.96	12.00
264	LUBE OIL FILL, TRANSFER, AND PURIF	4.1	191.96	16.00
290	SPECIAL PURPOSE SYSTEMS	12.5	222.19	9.55
298	OPERATING FLUIDS	9.3	228.00	8.00
299	REPAIR PARTS AND SPECIAL TOOLS	3.2	205.20	14.10

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 15 - ELECTRIC PLANT WEIGHT

SWBS	COMPONENT	WT,LTON	LCG,FT	VCG,FT
300	ELECTRIC PLANT	261.7	198.72	16.88
310	ELECTRIC POWER GENERATION	129.3	194.06	12.16
311	SHIP SERVICE POWER GENERATION	94.1	196.20	12.00
313	BATTERIES AND SERVICE FACILITIES	24.1	196.20	6.00
314	POWER CONVERSION EQUIPMENT	11.0	171.00	27.00
320	POWER DISTRIBUTION SYSTEMS	55.6	204.23	24.76
321	SHIP SERVICE POWER CABLE	34.9	201.40	27.00
324	SWITCHGEAR AND PANELS	20.7	209.00	21.00
330	LIGHTING SYSTEM	18.8	199.99	27.22
331	LIGHTING DISTRIBUTION	11.8	201.40	27.00
332	LIGHTING FIXTURES	7.0	197.60	27.60
340	POWER GENERATION SUPPORT SYSTEMS	39.2	194.38	17.56
342	DIESEL SUPPORT SYSTEMS	39.2	194.38	17.56
343	TURBINE SUPPORT SYSTEMS	0.0	0.00	0.00
390	SPECIAL PURPOSE SYSTEMS	18.8	222.20	14.25
398	OPERATING FLUIDS	14.1	196.20	12.00
399	REPAIR PARTS AND SPECIAL TOOLS	4.7	300.20	21.00

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 16 - MACHINERY ROOMS

NO MAIN MACHINERY ROOMS	2
NO AUX MACHINERY ROOMS	0
NO OTHER MACHINERY ROOMS	0

BULKHEAD LOCATIONS

MR NO	MR ID	FWD BHD: BHD NO	FWD BHD: X, FT	FWD BHD: X/LBP	AFT BHD: BHD NO	AFT BHD: X, FT	AFT BHD: X/LBP
1	MMR1	6.	136.45	0.359	7.	171.97	0.453
2	MMR2	9.	230.49	0.607	10.	266.00	0.700

DIMENSIONS

MR NO	MR ID	LENGTH, FT AVAIL	LENGTH, FT REQ	WIDTH, FT AVAIL	WIDTH, FT REQ	HEIGHT, FT AVAIL	HEIGHT, FT REQ
1	MMR1	35.51	35.51	49.17	21.30	21.29	19.63
2	MMR2	35.51	35.51	51.76	21.30	19.46	19.63

ARRANGEMENTS

MR NO	MR ID	ROTATION ANGLE,DEG
1	MMR1	0.00
2	MMR2	0.00

PRINTED REPORT NO. 17 - MACHINERY ARRANGEMENTS

CLEARANCES (MACHINERY TO MACHINERY)

ENG TO ENG CLR, FT	1.00
ENG TO GEAR CLR, FT OR ENG TO GEN CLR OR GEAR TO GEN CLR	1.00
MTR TO GEAR CLR, FT	2.50
PRPLN ARR TO SS ARR CLR, FT	6.00
AISLE WIDTH CLR, FT	2.50
PORT/CL TB TO GEAR CLR, FT	.00
STBD TB TO GEAR CLR, FT	.00

SEPARATIONS (BETWEEN HULL AND MACHINERY)

LONG (TO BHD), FT	1.00
TRANS (TO SIDE SHELL), FT	1.00
VERT (TO HULL BOT), FT	1.00
RADIAL (TO POD), FT	1.00

ARRANGEMENTS

ARRANGEMENT	TYPE	NO INSTALLED	NO ONLINE MAX+SUSTN	NO ONLINE ENDURANCE
ELECT PG ARR 1 IND	M-PG	2	2	1
ELECT PG ARR 2 IND		0	0	0
ELECT DL ARR IND	MTR	2	2	2
SHIP SERVICE ARR	DIESEL	2	2	1

MACHINERY COMPONENT LOCATIONS

COMPONENT	MR ID	CG LOC, FT X	Y	Z
MAIN ENG	MMR1	146.91	-6.17	15.00
MAIN ENG	MMR2	240.94	-6.17	15.00
SS ENG	MMR1	145.77	6.98	12.00
SS ENG	MMR2	239.81	6.98	12.00
PRPLN MTR		356.21	-8.30	3.28
PRPLN MTR		356.21	8.30	3.28

SHAFTING

SHAFT TYPE	END POINT LOC, FT X	Y	Z	SHAFT ANGLE, DEG
PORT SHAFT	349.51	-8.30	2.60	-5.81
STBD SHAFT	349.51	8.30	2.60	-5.81

PRINTED REPORT NO. 18 - MACHINERY SPACE REQUIREMENTS

MACHINERY ROOM VOLUME REQUIREMENTS

VOLUME CATEGORY	VOLUME, FT3
SWBS GROUP 200	71910.
PROPULSION POWER GENERATION	13921.
PROPULSION ENGINES	9126.
PROPULSION REDUCTION GEARS AND GENERATORS	4794.
DRIVELINE MACHINERY	0.
REDUCTION AND BEVEL GEARS WITH Z-DRIVE	0.
ELECTRIC PROPULSION MOTORS AND GEARS	0.
REMOTELY-LOCATED THRUST BEARINGS	0.
PROPELLER SHAFT	0.
ELECTRIC PROPULSION MISCELLANEOUS EQUIPMENT	9922.
CONTROLS	1489.
BRAKING RESISTORS	774.
MOTOR AND GENERATOR EXCITERS	1489.
SWITCHGEAR	726.
POWER CONVERTERS	669.
DEIONIZED COOLING WATER SYSTEMS	2352.
RECTIFIERS	550.
HELIUM REFRIGERATION SYSTEMS	1872.
PROPULSION AUXILIARIES	48068.
PROPULSION LOCAL CONTROL CONSOLES	3601.
CP PROP HYDRAULIC OIL POWER MODULES	0.
FUEL OIL PUMPS	24467.
LUBE OIL PUMPS	2618.
LUBE OIL PURIFIERS	15270.
ENGINE LUBE OIL CONDITIONERS	599.
SEAWATER COOLING PUMPS	1512.
SWBS GROUP 300	24822.
ELECTRIC PLANT POWER GENERATION	10232.
ELECTRIC PLANT ENGINES	6354.
ELECTRIC PLANT GENERATORS AND GEARS	3879.
SHIP SERVICE SWITCHBOARDS	14590.
CYCLOCONVERTERS	0.
SWBS GROUP 500	41979.
AUXILIARY MACHINERY	41979.
AIR CONDITIONING PLANTS	8787.
AUXILIARY BOILERS	1135.
FIRE PUMPS	2486.
DISTILLING PLANTS	10881.
AIR COMPRESSORS	5937.
ROLL FIN PAIRS	10157.
SEWAGE PLANTS	2596.

ARRANGEABLE AREA REQUIREMENTS NOTE: * DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS
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SSCS	GROUP NAME	FT2 HULL/DKHS	FT2 DKHS ONLY
4.31	AUXILIARY MACHINERY DELTA	8419.9	0.0
4.3311	SHIP SERVICE POWER GENERATION	0.0	0.0
4.132	INTERNAL COMB ENG COMB AIR	0.0	0.0
4.133	INTERNAL COMB ENG EXHAUST	69.6	69.6
4.142	GAS TURBINE ENG COMB AIR	138.6	138.6
4.143	GAS TURBINE ENG EXHAUST	342.6	182.1

PRINTED REPORT NO. 19 - SURFACE SHIP ENDURANCE CALCULATION FORM

DESIGN MODE IND-ENDURANCE
ENDUR DISP IND-AVG DISP
ENDUR DEF IND-USN
SHIP FUEL TYPE IND-JP-5

ENG ENDUR RPM IND-CALC

SHIP FUEL LHV, BTU/LBM 18300.
DFM FUEL LHV, BTU/LBM 18360.

(1)	ENDURANCE REQUIRED, NM	6000.
(2)	ENDURANCE SPEED, KT	14.00
(3)	FULL LOAD DISPLACEMENT, LTON	3980.1
(3A)	AVERAGE ENDURANCE DISPLACEMENT, LTON	3810.6
(4)	RATED FULL POWER SHP, HP	28775.
(5)	DESIGN ENDURANCE POWER SHP @ (2)&(3A), HP	3238.
(6)	AVERAGE ENDURANCE POWER (SHP), HP (5) X 1.10	3562.
(7)	RATIO, AVG END SHP/RATED F.P. SHP (6)/(4)	0.12379
(8)	AVERAGE ENDURANCE BHP, HP (8A)+(8B)	3897.
(8A)	AVERAGE PRPLN ENDURANCE BHP, HP (6)/TRANSMISSION EFFICIENCY	3897.
(8B)	SHIP SERV PWR SUPPLIED BY PRPLN ENG, HP	0.
(9)	24 HOUR AVERAGE ELECTRIC LOAD, KW	1142.
(9A)	24 HOUR AVERAGE ELECTRIC LOAD PORTION SUPPLIED BY SS ENG, KW	1142.
(10)	CALCULATED PROPULSION FUEL RATE @(8), LBM/HP-HR	0.342
(11)	CALC PRPLN FUEL CONSUMPTION, LBM/HR (10)X(8)	1334.2
(12)	CALC SS GEN FUEL RATE @ (9A), LBM/KW-HR	0.479
(13)	CALC SS GEN FUEL CONSUMPTION, LBM/HR (12)X(9A)	547.0
(14)	CALC FUEL CONSUMPTION FOR OTHER SERVICES, LBM/HR	0.0
(15)	TOTAL CALC ALL-PURPOSE FUEL CONSUMPTION, LBM/HR (11)+(13)+14)	1881.2
(16)	CALC ALL-PURPOSE FUEL RATE, LBM/HP-HR (15)/(6)	0.528
(17)	FUEL RATE CORRECTION FACTOR BASED ON (7)	1.0400
(18)	SPECIFIED FUEL RATE, LBM/HP-HR (16)X(17)	0.549
(19)	AVG ENDURANCE FUEL RATE, LBM/HP-HR (18)X1.05	0.577
(20)	ENDURANCE FUEL (BURNABLE), LTON (1)X(6)X(19)/(2)X2240	394.3 *
(21)	TAILPIPE ALLOWANCE FACTOR	0.95
(22)	ENDURANCE FUEL LOAD, LTON (20)/(21)	415.1

ENG ENDUR RPM IND- pkÄ?

PRINTED REPORT NO. 20 - MACHINERY MARGINS

PROPULSION PLANT

MAIN ENG MAX LOAD FRAC	1.000
SEC ENG MAX LOAD FRAC	
TORQUE MARGIN FAC	1.200

ELECTRIC PLANT

SS ENG MAX LOAD FRAC	1.000
ELECT LOAD DES MARGIN FAC	0.200
ELECT LOAD SL MARGIN FAC	0.100
ELECT LOAD IMBAL FAC	0.900

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ASSET/MONOSC VERSION 3.3+ - AUXILIARY SYS MODULE - 2/11/95  10.48.51.

PRINTED REPORT NO. 1 - SUMMARY

LBP,FT                        380.0     TOTAL ACCOM                 122.0
BEAM,FT                        51.0     COLL PROT SYS IND         PRESENT
TOTAL AREA,FT2               40398.     COMP HTR TYPE IND        ELECTRIC
TOTAL VOLUME,FT3            498689.     DISTILLER TYPE IND     RE OSMOSIS
USABLE FUEL WT,LTON           394.3     WATER HTR TYPE IND        INSTANT
FULL LOAD WT,LTON            3980.1     ANCHOR LOC IND             BOTTOM
MAX SHP, HP                  31804.     PRAIRIE SYS IND           PRESENT
                                        MASKER SYS IND            PRESENT
SEP GEN:     5736.0 KW

TOTAL AIRCOND LOAD, TON       176.1     TOTAL STEAM LOAD, LB/HR      110.
NO AIRCOND UNITS                3.0     AUX BOILER TYPE IND      ELECTRIC
TOTAL AIRCOND CAP, TON        375.0     NO AUX BOILERS                 2.
SWBS 514 WT,LTON               74.3     TOTAL AUX BLR CAP, LB/HR     200.
                                        SWBS 517 WT,LTON              0.3
BOAT SELECT IND               GIVEN
BOAT TYPE IND                   RIB
BOAT COMPLEMENT    2 RIB                NO FAS STATIONS                2.
SWBS 583 WT,LTON                9.6     RAS STATIONS:       NO       TYPE
                                                            2.   BULKHEAD

                                        SSCS 3.53 AREA,FT2          212.9
STRIKE GEAR:     NO           TYPE      SWBS 571 WT,LTON             10.7
                 2.         PALLET

STRK DECK AREA,FT2            478.6     STOWAGE AREA,FT2           2427.0
SWBS 572 WT,LTON               35.1     SWBS 671 WT,LTON              4.3
                                        SWBS 672 WT,LTON             27.1

PRINTED REPORT NO.  2- AIRCONDITIONING

AIRCOND MARGIN                 0.20     TOTAL ACCOM                 122.0
SHIP AIRCOND LOAD, TON        146.7     COLL PROT SYS IND         PRESENT
AIRCOND MARGIN LOAD, TON       29.3
TOTAL AIRCOND LOAD, TON       176.1     SWBS 514 WT,LTON             74.3
AIRCOND UNIT CAP, TON         125.0     SWBS 514 VCG,FT              17.2
NO AIRCOND UNITS                3.0
TOTAL AIRCOND CAP, TON        375.0

PRINTED REPORT NO.  3- AUXILIARY BOILERS

AUX BOILER TYPE IND        ELECTRIC     TOTAL ACCOM                 122.0
NO AUX BOILERS                   2.     COLL PROT SYS IND         PRESENT
AUX BLR UNIT CAP, LB/HR        100.     COMP HTR TYPE IND        ELECTRIC
TOTAL AUX BLR CAP, LB/HR       200.     DISTILLER TYPE IND     RE OSMOSIS

SWBS 261 STEAM LOAD            863.     SWBS 517 WT,LTON             74.3
SWBS 264 STEAM LOAD             30.     SWBS 517 VCG,FT              17.2
SWBS 511 STEAM LOAD              0.
SWBS 517 STEAM LOAD            138.
SWBS 531 STEAM LOAD              0.
SWBS 533 STEAM LOAD            933.
SWBS 541 STEAM LOAD            604.
SWBS 651 STEAM LOAD             49.
SWBS 655 STEAM LOAD             61.
                           --------
TOTAL STEAM LOAD, LB/HR        110.

PRINTED REPORT NO.  4- BOATS

BOAT SELECT IND               GIVEN     BOAT COMP WT,LTON             7.7
BOAT TYPE IND                   RIB
BOAT COMPLEMENT    2 RIB                SWBS 583 WT,LTON              9.6
                                        SWBS 583 VCG,FT              37.0

PRINTED REPORT NO.  5- REPLENISHMENT SYSTEMS

NO FAS STATIONS                  2.
FAS STATION WT,LTON             0.5

RAS STATIONS:     NO           TYPE
                  2.       BULKHEAD

RAS STATION WT,LTON            10.2     DKHS ONLY AREA,FT2          212.9
RAS STATION VCG,FT             37.0     SSCS 3.53 AREA,FT2          212.9
SWBS 571 WT,LTON               10.7
SWBS 571 VCG,FT                36.8
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PRINTED REPORT NO. 6- STRIKE GEAR

STRIKE GEAR:	NO	TYPE
	2.	PALLET

STRK DECK AREA,FT2	478.6
SWBS 572 WT,LTON	35.1
SWBS 572 VCG,FT	23.9

PRINTED REPORT NO. 7- STOWAGE SYSTEMS

STOWAGE SSCS SPACES AND ASSOCIATED FACTORS

SSCS SPACES	STOW UTIL FACTOR	STOW EFF FACTOR	DECK LOAD LB/FT2	STACK HEIGHT,FT
A1390	0.36	0.45	25.00	6.50
A2230	1.00	0.50	3.70	6.50
A2410	0.67	0.47	14.70	6.50
A2620	0.58	0.45	14.70	6.50
A3700	0.54	0.45	32.10	6.50

STOWAGE AREA,FT2	2427.0
SWBS 671 WT,LTON	4.3
SWBS 671 VCG,FT	22.3
SWBS 672 WT,LTON	27.1
SWBS 672 VCG,FT	14.2

PRINTED REPORT NO. 8 - AUXILIARY SYSTEMS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
500	AUXILIARY SYSTEMS, GENERAL	494.2	18.80
510	CLIMATE CONTROL	134.0	22.40
511	COMPARTMENT HEATING SYSTEM	4.5	25.83
512	VENTILATION SYSTEM	44.0	28.97
513	MACHINERY SPACE VENT SYSTEM	9.1	32.71
514	AIR CONDITIONING SYSTEM	74.3	17.24
516	REFRIGERATION SYSTEM	1.9	14.97
517	AUX BOILERS+OTHER HEAT SOURCES	.3	17.63
520	SEA WATER SYSTEMS	40.6	19.65
521	FIREMAIN+SEA WATER FLUSHING SYS	21.5	18.75
522	SPRINKLING SYSTEM		21.82
523	WASHDOWN SYSTEM	3.0	34.11
524	AUXILIARY SEAWATER SYSTEM		
526	SCUPPERS+DECK DRAINS	.8	31.85
527	FIREMAIN ACTUATED SERV, OTHER		
528	PLUMBING DRAINAGE	12.0	19.64
529	DRAINAGE+BALLASTING SYSTEM	3.4	9.91
530	FRESH WATER SYSTEMS	23.8	20.74
531	DISTILLING PLANT	3.8	15.91
* 532	COOLING WATER	4.0	47.47
533	POTABLE WATER	6.0	19.70
534	AUX STEAM + DRAINS IN MACH BOX	10.0	12.49
535	AUX STEAM + DRAINS OUT MACH BOX		
536	AUXILIARY FRESH WATER COOLING		
540	FUELS/LUBRICANTS,HANDLING+STORAGE	31.1	12.53
541	SHIP FUEL+COMPENSATING SYSTEM	29.8	12.91
542	AVIATION+GENERAL PURPOSE FUELS		
543	AVIATION+GENERAL PURPOSE LUBO		
544	LIQUID CARGO		
545	TANK HEATING	1.3	3.88
549	SPEC FUEL+LUBRICANTS HANDL+STOW		
550	AIR,GAS+MISC FLUID SYSTEM	43.5	18.69
551	COMPRESSED AIR SYSTEMS	20.1	16.63
552	COMPRESSED GASES		
553	O2 N2 SYSTEM		
554	LP BLOW		
555	FIRE EXTINGUISHING SYSTEMS	23.5	20.47
556	HYDRAULIC FLUID SYSTEM		
557	LIQUID GASES, CARGO		
558	SPECIAL PIPING SYSTEMS		
560	SHIP CNTL SYS	75.6	5.63
561	STEERING+DIVING CNTL SYS	11.7	17.36
562	RUDDER	27.4	7.00
565	TRIM+HEEL SYSTEMS	36.5	.83
568	MANEUVERING SYSTEMS		
570	UNDERWAY REPLENISHMENT SYSTEMS	45.8	26.91
571	REPLENISHMENT-AT-SEA SYSTEMS	10.7	36.82
572	SHIP STORES+EQUIP HANDLING SYS	35.1	23.88
573	CARGO HANDLING SYSTEMS		

574	VERTICAL REPLENISHMENT SYSTEMS		
580	MECHANICAL HANDLING SYSTEMS	48.7	26.27
581	ANCHOR HANDLING+STOWAGE SYSTEMS	24.1	18.78
582	MOORING+TOWING SYSTEMS	10.1	30.76
583	BOATS,HANDLING+STOWAGE SYSTEMS	9.6	37.00
584	MECH OPER DOOR,GATE,RAMP,TTBL SYS		
585	ELEVATING + RETRACTING GEAR		
586	AIRCRAFT RECOVERY SUPPORT SYS		
587	AIRCRAFT LAUNCH SUPPORT SYSTEM		
* 588	AIRCRAFT HANDLING,SERVICING,STOWAGE	5.0	32.76
589	MISC MECH HANDLING SYSTEMS		
590	SPECIAL PURPOSE SYSTEMS	51.0	16.75
591	SCIENTIFIC+OCEAN ENGINEERING SYS		
592	SWIMMER+DIVER SUPPORT+PROT SYS		
593	ENVIRONMENTAL POLLUTION CNTL SYS	9.8	11.38
594	SUBMARINE RESC+SALVG+SURVIVE SYS		
595	TOW,LAUNCH,HANDLE UNDERWATER SYS		
596	HANDLING SYS FOR DIVER+SUBMR VEH		
597	SALVAGE SUPPORT SYSTEMS		
598	AUX SYSTEMS OPERATING FLUIDS	35.7	18.34
599	AUX SYSTEMS REPAIR PARTS+TOOLS	5.4	16.01

OUTFIT+FURNISHINGS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
671	LOCKERS+SPECIAL STOWAGE	4.3	22.29
672	STOREROOMS+ISSUE ROOMS	27.1	14.15

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS
ASSET/MONOSC VERSION 3.3+ - WEIGHT MODULE - 2/11/95 10.49.06.

PRINTED REPORT NO. 1 - SUMMARY

SWBS	GROUP	WEIGHT LTON	WEIGHT PER CENT	LCG FT	VCG FT	RESULTANT ADJ WT-LTON	RESULTANT ADJ VCG-FT
100	HULL STRUCTURE	1320.9	33.2	187.33	21.35		
200	PROP PLANT	281.3	7.1	246.35	13.45		
300	ELECT PLANT	261.7	6.6	198.72	16.88		
400	COMM + SURVEIL	144.9	3.6	144.40	25.34	97.6	.60
500	AUX SYSTEMS	494.2	12.4	209.00	18.80		
600	OUTFIT + FURN	314.0	7.9	190.00	20.68		
700	ARMAMENT	209.6	5.3	171.00	18.29	197.4	.92
M11	D+B WT MARGIN	378.3	9.5	194.43	19.72		
	D+B KG MARGIN			+	2.47		
	LIGHTSHIP	3405.0	85.6	194.43	22.19	295.0	1.52
F00	FULL LOADS	575.1	14.4	203.24	5.24	108.4	.26
F10	CREW + EFFECTS	13.0		178.60	22.98		
F20	MISS REL EXPEN	44.6		167.20	9.48		
F30	SHIPS STORES	17.4		205.20	17.23		
F40	FUELS + LUBRIC	482.0		208.11	3.97		
F50	FRESH WATER	18.1			4.33		
F60	CARGO						
M24	FUTURE GROWTH						
	FULL LOAD WT	3980.1	100.0	195.70	19.74	403.4	1.78

PRINTED REPORT NO. 2 - HULL STRUCTURES WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
100	HULL STRUCTURES	1320.9	21.35
110	SHELL + SUPPORTS	379.3	13.49
111	PLATING	218.6	18.75
113	INNER BOTTOM	36.5	4.50
114	SHELL APPENDAGES	17.2	3.69
115	STANCHIONS	5.1	15.00
116	LONGIT FRAMING	63.8	1.47
117	TRANSV FRAMING	38.1	16.24
120	HULL STRUCTURAL BULKHDS	78.0	18.79
121	LONGIT STRUCTURAL BULKHDS		
122	TRANSV STRUCTURAL BULKHDS	66.6	18.79
123	TRUNKS + ENCLOSURES	11.3	18.79
124	BULKHEADS, TORPEDO PROTECT SYS		
130	HULL DECKS	261.0	26.76
131	MAIN DECK	153.3	31.05
132	2ND DECK	107.7	20.66
133	3RD DECK		
134	4TH DECK		
135	5TH DECK+DECKS BELOW		
136	01 HULL DECK		
137	02 HULL DECK		
138	03 HULL DECK		
139	04 HULL DECK		
140	HULL PLATFORMS/FLATS	58.2	12.21
141	1ST PLATFORM	58.2	12.21
142	2ND PLATFORM		
143	3RD PLATFORM		
144	4TH PLATFORM		
145	5TH PLAT+PLATS BELOW		
149	FLATS		
150	DECK HOUSE STRUCTURE	212.7	36.29
160	SPECIAL STRUCTURES	61.5	15.94
161	CASTINGS+FORGINGS+EQUIV WELDMT	33.1	9.19
162	STACKS AND MACKS	2.1	46.46
163	SEA CHESTS	3.3	3.70
164	BALLISTIC PLATING		
165	SONAR DOMES		
166	SPONSONS		
167	HULL STRUCTURAL CLOSURES	18.1	21.97
168	DKHS STRUCTURAL CLOSURES	.8	38.64
169	SPECIAL PURPOSE CLOSURES+STRUCT	4.2	33.05
170	MASTS+KINGPOSTS+SERV PLATFORM	31.6	79.40
171	MASTS,TOWERS,TETRAPODS	31.6	79.40
172	KINGPOSTS AND SUPPORT FRAMES		
179	SERVICE PLATFORMS		
180	FOUNDATIONS	225.5	11.81
181	HULL STRUCTURE FOUNDATIONS		
182	PROPULSION PLANT FOUNDATIONS	93.2	7.48
183	ELECTRIC PLANT FOUNDATIONS	45.8	12.82
184	COMMAND+SURVEILLANCE FDNS	11.9	23.57
185	AUXILIARY SYSTEMS FOUNDATIONS	49.4	14.03
186	OUTFIT+FURNISHINGS FOUNDATIONS	9.5	18.08
187	ARMAMENT FOUNDATIONS	15.7	14.84
190	SPECIAL PURPOSE SYSTEMS	13.1	4.00
191	BALLAST+BOUYANCY UNITS		
197	WELDING AND RIVETS		
198	FREE FLOODING LIQUIDS	13.1	4.00

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 3 - PROPULSION PLANT WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
200	PROPULSION PLANT	281.3	13.45
210	ENERGY GEN SYS (NUCLEAR)		
220	ENERGY GENERATING SYSTEM (NONNUC)		
221	PROPULSION BOILERS		
222	GAS GENERATORS		
223	MAIN PROPULSION BATTERIES		
224	MAIN PROPULSION FUEL CELLS		
230	PROPULSION UNITS	186.8	12.19
231	STEAM TURBINES		
232	STEAM ENGINES		
233	DIESEL ENGINES		
234	GAS TURBINES	60.8	17.38
235	ELECTRIC PROPULSION	126.0	9.68
236	SELF-CONTAINED PROPULSION SYS		
237	AUXILIARY PROPULSION DEVICES		
240	TRANSMISSION+PROPULSOR SYSTEMS	21.7	2.36
241	REDUCTION GEARS		
242	CLUTCHES + COUPLINGS		
243	SHAFTING	1.4	2.45
244	SHAFT BEARINGS	6.3	2.71
245	PROPULSORS	14.0	2.19
246	PROPULSOR SHROUDS AND DUCTS		
247	WATER JET PROPULSORS		
250	SUPPORT SYSTEMS	36.6	28.42
251	COMBUSTION AIR SYSTEM	10.5	27.43
252	PROPULSION CONTROL SYSTEM	9.4	19.50
253	MAIN STEAM PIPING SYSTEM		
254	CONDENSERS AND AIR EJECTORS		
255	FEED AND CONDENSATE SYSTEM		
256	CIRC + COOL SEA WATER SYSTEM	2.6	10.80
258	H.P. STEAM DRAIN SYSTEM		
259	UPTAKES (INNER CASING)	14.2	38.18
260	PROPUL SUP SYS- FUEL, LUBE OIL	23.7	12.44
261	FUEL SERVICE SYSTEM	9.4	11.38
262	MAIN PROPULSION LUBE OIL SYSTEM	10.2	12.00
264	LUBE OIL HANDLING	4.1	16.00
290	SPECIAL PURPOSE SYSTEMS	12.5	9.55
298	OPERATING FLUIDS	9.3	8.00
299	REPAIR PARTS + TOOLS	3.2	14.10

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 4 - ELECTRIC PLANT WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
300	ELECTRIC PLANT, GENERAL	261.7	16.88
310	ELECTRIC POWER GENERATION	129.3	12.16
311	SHIP SERVICE POWER GENERATION	94.1	12.00
312	EMERGENCY GENERATORS		
313	BATTERIES+SERVICE FACILITIES	24.1	6.00
314	POWER CONVERSION EQUIPMENT	11.0	27.00
320	POWER DISTRIBUTION SYS	55.6	24.76
321	SHIP SERVICE POWER CABLE	34.9	27.00
322	EMERGENCY POWER CABLE SYS		
323	CASUALTY POWER CABLE SYS		
324	SWITCHGEAR+PANELS	20.7	21.00
330	LIGHTING SYSTEM	18.8	27.22
331	LIGHTING DISTRIBUTION	11.8	27.00
332	LIGHTING FIXTURES	7.0	27.60
340	POWER GENERATION SUPPORT SYS	39.2	17.56
341	SSTG LUBE OIL		
342	DIESEL SUPPORT SYS	39.2	17.56
343	TURBINE SUPPORT SYS		
390	SPECIAL PURPOSE SYS	18.8	14.25
398	ELECTRIC PLANT OP FLUIDS	14.1	12.00
399	REPAIR PARTS+SPECIAL TOOLS	4.7	21.00

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 5 - COMMAND+SURVEILLANCE WEIGHT

	SWBS	COMPONENT	WT-LTON	VCG-FT
	400	COMMAND+SURVEILLANCE	144.9	25.34
*	410	COMMAND+CONTROL SYS	37.0	1.47
	411	DATA DISPLAY GROUP		
	412	DATA PROCESSING GROUP		
	413	DIGITAL DATA SWITCHBOARDS		
	414	INTERFACE EQUIPMENT		
	415	DIGITAL DATA COMMUNICATIONS		
	417	COMMAND+CONTROL ANALOG SWBD		
*	420	NAVIGATION SYS	3.8	45.94
	430	INTERIOR COMMUNICATIONS	18.7	25.42
*	440	EXTERIOR COMMUNICATIONS	16.0	21.80
	441	RADIO SYSTEMS		
	442	UNDERWATER SYSTEMS		
	443	VISUAL + AUDIBLE SYSTEMS		
	444	TELEMETRY SYSTEMS		
	445	TTY + FACSIMILE SYSTEMS		
	446	SECURITY EQUIPMENT SYSTEMS		
	450	SURF SURV SYS (RADAR)	22.0	61.59
*	451	SURFACE SEARCH RADAR	1.8	59.50
	452	AIR SEARCH RADAR (2D)		
	453	AIR SEARCH RADAR (3D)		
	454	AIRCRAFT CONTROL APPROACH RADAR		
*	455	IDENTIFICATION SYSTEMS (IFF)	2.3	60.00
*	456	MULTIPLE MODE RADAR	18.0	62.00
	459	SPACE VEHICLE ELECTRONIC TRACKG		
*	460	UNDERWATER SURVEILLANCE SYSTEMS	14.3	25.83
	461	ACTIVE SONAR		
*	462	PASSIVE SONAR	14.1	25.76
	463	MULTIPLE MODE SONAR		
	464	CLASSIFICATION SONAR		
	465	BATHYTHERMOGRAPH		
	466	LAMPS ELECTRONICS		
	470	COUNTERMEASURES	22.3	25.57
	471	ACTIVE + ACTIVE/PASSIVE ECM		
*	472	PASSIVE ECM	3.0	51.00
*	473	TORPEDO DECOYS	3.6	22.76
	474	DECOYS (OTHER)		
	475	DEGAUSSING	15.7	21.34
	476	MINE COUNTERMEASURES		
	480	FIRE CONTROL SYS		
	481	GUN FIRE CONTROL SYSTEMS		
	482	MISSILE FIRE CONTROL SYSTEMS		
	483	UNDERWATER FIRE CONTROL SYSTEMS		
	484	INTEGRATED FIRE CONTROL SYSTEMS		
	489	WEAPON SYSTEM SWITCHBOARDS		
	490	SPECIAL PURPOSE SYS	10.8	29.81
*	491	ELCTRNC TEST,CHKOUT,MONITR EQPT	6.3	33.72
	492	FLIGHT CNTRL+INSTR LANDING SYS		
	493	NON-COMBAT DATA PROCESSING SYS	2.3	21.82
	494	METEOROLOGICAL SYSTEMS		
	495	SPEC PURPOSE INTELLIGENCE SYS		
	498	C+S OPERATING FLUIDS		
	499	REPAIR PARTS+SPECIAL TOOLS	2.1	26.99

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 6 - AUXILIARY SYSTEMS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
500	AUXILIARY SYSTEMS, GENERAL	494.2	18.80
510	CLIMATE CONTROL	134.0	22.40
511	COMPARTMENT HEATING SYSTEM	4.5	25.83
512	VENTILATION SYSTEM	44.0	28.97
513	MACHINERY SPACE VENT SYSTEM	9.1	32.71
514	AIR CONDITIONING SYSTEM	74.3	17.24
516	REFRIGERATION SYSTEM	1.9	14.97
517	AUX BOILERS+OTHER HEAT SOURCES	.3	17.63
520	SEA WATER SYSTEMS	40.6	19.65
521	FIREMAIN+SEA WATER FLUSHING SYS	21.5	18.75
522	SPRINKLING SYSTEM		21.82
523	WASHDOWN SYSTEM	3.0	34.11
524	AUXILIARY SEAWATER SYSTEM		
526	SCUPPERS+DECK DRAINS	.8	31.85
527	FIREMAIN ACTUATED SERV, OTHER		
528	PLUMBING DRAINAGE	12.0	19.64
529	DRAINAGE+BALLASTING SYSTEM	3.4	9.91

	530 FRESH WATER SYSTEMS	23.8	20.74
	531 DISTILLING PLANT	3.8	15.91
*	532 COOLING WATER	4.0	47.47
	533 POTABLE WATER	6.0	19.70
	534 AUX STEAM + DRAINS IN MACH BOX	10.0	12.49
	535 AUX STEAM + DRAINS OUT MACH BOX		
	536 AUXILIARY FRESH WATER COOLING		
	540 FUELS/LUBRICANTS,HANDLING+STORAGE	31.1	12.53
	541 SHIP FUEL+COMPENSATING SYSTEM	29.8	12.91
	542 AVIATION+GENERAL PURPOSE FUELS		
	543 AVIATION+GENERAL PURPOSE LUBO		
	544 LIQUID CARGO		
	545 TANK HEATING	1.3	3.88
	549 SPEC FUEL+LUBRICANTS HANDL+STOW		
	550 AIR,GAS+MISC FLUID SYSTEM	43.5	18.69
	551 COMPRESSED AIR SYSTEMS	20.1	16.63
	552 COMPRESSED GASES		
	553 O2 N2 SYSTEM		
	554 LP BLOW		
	555 FIRE EXTINGUISHING SYSTEMS	23.5	20.47
	556 HYDRAULIC FLUID SYSTEM		
	557 LIQUID GASES, CARGO		
	558 SPECIAL PIPING SYSTEMS		
	560 SHIP CNTL SYS	75.6	5.63
	561 STEERING+DIVING CNTL SYS	11.7	17.36
	562 RUDDER	27.4	7.00
	565 TRIM+HEEL SYSTEMS	36.5	.83
	568 MANEUVERING SYSTEMS		
	570 UNDERWAY REPLENISHMENT SYSTEMS	45.8	26.91
	571 REPLENISHMENT-AT-SEA SYSTEMS	10.7	36.82
	572 SHIP STORES+EQUIP HANDLING SYS	35.1	23.88
	573 CARGO HANDLING SYSTEMS		
	574 VERTICAL REPLENISHMENT SYSTEMS		
	580 MECHANICAL HANDLING SYSTEMS	48.7	26.27
	581 ANCHOR HANDLING+STOWAGE SYSTEMS	24.1	18.78
	582 MOORING+TOWING SYSTEMS	10.1	30.76
	583 BOATS,HANDLING+STOWAGE SYSTEMS	9.6	37.00
	584 MECH OPER DOOR,GATE,RAMP,TTBL SYS		
	585 ELEVATING + RETRACTING GEAR		
	586 AIRCRAFT RECOVERY SUPPORT SYS		
	587 AIRCRAFT LAUNCH SUPPORT SYSTEM		
*	588 AIRCRAFT HANDLING,SERVICING,STOWAGE	5.0	32.76
	589 MISC MECH HANDLING SYSTEMS		
	590 SPECIAL PURPOSE SYSTEMS	51.0	16.75
	591 SCIENTIFIC+OCEAN ENGINEERING SYS		
	592 SWIMMER+DIVER SUPPORT+PROT SYS		
	593 ENVIRONMENTAL POLLUTION CNTL SYS	9.8	11.38
	594 SUBMARINE RESC+SALVG+SURVIVE SYS		
	595 TOW,LAUNCH,HANDLE UNDERWATER SYS		
	596 HANDLING SYS FOR DIVER+SUBMR VEH		
	597 SALVAGE SUPPORT SYSTEMS		
	598 AUX SYSTEMS OPERATING FLUIDS	35.7	18.34
	599 AUX SYSTEMS REPAIR PARTS+TOOLS	5.4	16.01

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 7 - OUTFIT+FURNISHINGS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
600	OUTFIT+FURNISHING,GENERAL	314.0	20.68
610	SHIP FITTINGS	8.9	35.34
611	HULL FITTINGS	1.8	28.15
612	RAILS,STANCHIONS+LIFELINES	6.3	36.29
613	RIGGING+CANVAS	.8	43.55
620	HULL COMPARTMENTATION	72.7	19.05
621	NON-STRUCTURAL BULKHEADS	19.4	27.15
622	FLOOR PLATES+GRATING	38.9	12.74
623	LADDERS	9.3	22.25
624	NON-STRUCTURAL CLOSURES	3.9	26.99
625	AIRPORTS,FIXED PORTLIGHTS,WINDOWS	1.1	43.87
630	PRESERVATIVES+COVERINGS	128.2	20.84
631	PAINTING	31.2	17.24
632	ZINC COATING		
633	CATHODIC PROTECTION	2.2	7.00
634	DECK COVERINGS	26.9	23.67
635	HULL INSULATION	41.5	26.62
636	HULL DAMPING	13.3	4.04
637	SHEATHING	8.2	28.80
638	REFRIGERATION SPACES	4.9	17.67
639	RADIATION SHIELDING		
640	LIVING SPACES	24.7	21.78
641	OFFICER BERTHING+MESSING	6.8	30.55
642	NON-COMM OFFICER B+M	3.0	23.13
643	ENLISTED PERSONNEL B+M	12.1	16.58
644	SANITARY SPACES+FIXTURES	1.5	22.25
645	LEISURE+COMMUNITY SPACES	1.2	20.07
650	SERVICE SPACES	9.9	22.15
651	COMMISSARY SPACES	4.9	22.25
652	MEDICAL SPACES	1.3	25.09
653	DENTAL SPACES		
654	UTILITY SPACES	1.2	25.31
655	LAUNDRY SPACES	2.2	18.33
656	TRASH DISPOSAL SPACES	.4	23.13
660	WORKING SPACES	35.0	23.60
661	OFFICES	10.3	23.78
662	MACH CNTL CENTER FURNISHING	.7	13.76
663	ELECT CNTL CENTER FURNISHING	5.3	29.45
664	DAMAGE CNTL STATIONS	8.0	24.22
665	WORKSHOPS,LABS,TEST AREAS	10.7	20.73
670	STOWAGE SPACES	31.4	15.26
671	LOCKERS+SPECIAL STOWAGE	4.3	22.29
672	STOREROOMS+ISSUE ROOMS	27.1	14.15
673	CARGO STOWAGE		
690	SPECIAL PURPOSE SYSTEMS	3.3	18.94
698	OPERATING FLUIDS	.2	20.18
699	REPAIR PARTS+SPECIAL TOOLS	3.1	18.87

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 8 - ARMAMENT WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
700	ARMAMENT	209.6	18.29
* 710	GUNS+AMMUNITION	36.3	27.00
711	GUNS		
712	AMMUNITION HANDLING		
713	AMMUNITION STOWAGE		
720	MISSLES+ROCKETS	157.0	16.70
* 721	LAUNCHING DEVICES	157.0	16.70
722	MISSILE,ROCKET,GUID CAP HANDL SYS		
723	MISSILE+ROCKET STOWAGE		
724	MISSILE HYDRAULICS		
725	MISSILE GAS		
726	MISSILE COMPENSATING		
727	MISSILE LAUNCHER CONTROL		
728	MISSILE HEAT,COOL,TEMP CNTRL		
729	MISSILE MONITOR,TEST,ALINEMENT		
730	MINES		
731	MINE LAUNCHING DEVICES		
732	MINE HANDLING		
733	MINE STOWAGE		
740	DEPTH CHARGES		
741	DEPTH CHARGE LAUNCHING DEVICES		
742	DEPTH CHARGE HANDLING		
743	DEPTH CHARGE STOWAGE		

	SWBS	COMPONENT	WT-LTON	VCG-FT
*	750	TORPEDOES	2.7	2.50
	751	TORPEDO TUBES		
	752	TORPEDO HANDLING		
	753	TORPEDO STOWAGE		
	760	SMALL ARMS+PYROTECHNICS	1.7	27.30
	761	SMALL ARMS+PYRO LAUNCHING DEV	1.0	27.30
	762	SMALL ARMS+PYRO HANDLING		
	763	SMALL ARMS+PYRO STOWAGE	.7	27.30
	770	CARGO MUNITIONS		
	772	CARGO MUNITIONS HANDLING		
	773	CARGO MUNITIONS STOWAGE		
*	780	AIRCRAFT RELATED WEAPONS	1.4	28.30
	782	AIRCRAFT RELATED WEAPONS HANDL		
	783	AIRCRAFT RELATED WEAPONS STOW		
	790	SPECIAL PURPOSE SYSTEMS	10.5	13.23
	791	SPECIAL WEAPONS		
	792	SPECIAL WEAPONS HANDLING		
	793	SPECIAL WEAPONS STOWAGE		
	797	MISC ORDINANCE SPACES		
	798	ARMAMENT OPERATING FLUIDS	2.3	19.30
	799	ARMAMENT REPAIR PART+TOOLS	8.1	11.51

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 9 - LOADS WEIGHT (FULL LOAD CONDITION)

	SWBS	COMPONENT	WT-LTON	VCG-FT
	F00	LOADS	575.1	5.24
	F10	SHIPS FORCE	13.0	22.98
	F11	OFFICERS	2.7	22.98
	F12	NON-COMMISSIONED OFFICERS	1.9	22.98
	F13	ENLISTED MEN	8.4	22.98
	F14	MARINES		
	F15	TROOPS		
	F16	AIR WING PERSONNEL		
	F19	OTHER PERSONNEL		
	F20	MISSION RELATED EXPENDABLES+SYS	44.6	9.48
*	F21	SHIP AMMUNITION	38.2	8.72
	F22	ORD DEL SYS AMMO		
*	F23	ORD DEL SYS (AIRCRAFT)	4.4	5.00
	F24	ORD REPAIR PARTS (SHIP)		
	F25	ORD REPAIR PARTS (ORD)		
*	F26	ORD DEL SYS SUPPORT EQUIP	2.0	33.76
	F29	SPECIAL MISSION RELATED SYS		
	F30	STORES	17.4	17.23
	F31	PROVISIONS+PERSONNEL STORES	14.2	16.82
	F32	GENERAL STORES	3.2	19.05
	F33	MARINES STORES (SHIPS COMPLEM)		
	F39	SPECIAL STORES		
	F40	LIQUIDS, PETROLEUM BASED	482.0	3.97
	F41	DIESEL FUEL MARINE	415.1	3.10
*	F42	JP-5	63.8	9.84
	F43	GASOLINE		
	F44	DISTILLATE FUEL		
	F45	NAVY STANDARD FUEL OIL (NSFO)		
	F46	LUBRICATING OIL	3.1	
	F49	SPECIAL FUELS AND LUBRICANTS		
	F50	LIQUIDS, NON-PETRO BASED	18.1	4.33
	F51	SEA WATER		
	F52	FRESH WATER	18.1	4.33
	F53	RESERVE FEED WATER		
	F54	HYDRAULIC FLUID		
	F55	SANITARY TANK LIQUID		
	F56	GAS (NON FUEL TYPE)		
	F59	MISC LIQUIDS, NON-PETROLEUM		
	F60	CARGO		
	F61	CARGO, ORDINANCE + DELIVERY SYS		
	F62	CARGO, STORES		
	F63	CARGO, FUELS + LUBRICANTS		
	F64	CARGO, LIQUIDS, NON-PETROLEUM		
	F65	CARGO, CRYOGENIC+LIQUEFIED GAS		
	F66	CARGO, AMPHIBIOUS ASSAULT SYS		
	F67	CARGO, GASES		
	F69	CARGO, MISCELLANEOUS		
	M24	FUTURE GROWTH MARGIN		

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 10 - WEIGHT AND KG MODIFICATION SUMMARY

ROW	P+A NAME	WT KEYS	ORIGINAL WT, LTON	WT CHNG, LTON	RESULTNT WT, LTON	ORIGINAL KG, FT	KG CHNG, FT	RESU LTNT KG, FT
1	CIC COMMAND AND DECISION MODFIG	W410	0.0	7.0		UNKNOWN	-7.2	
11	CS HOLD UP BATTERY			30.0	37.0		3.5	1.5
3	NAV SYS (1/2 DDG 51)	W420	UNKNOWN	UNKNOWN	3.8	UNKNOWN	46.0	45.9
2	EXCOMM (1/2 DDG51)	W440	0.0	16.0	16.0	UNKNOWN	21.8	21.8
4	SPS-67 SSR	W451	0.0	1.8	1.8	UNKNOWN	59.5	59.5
6	MK XII AIMS IFF	W455	0.0	2.3	2.3	UNKNOWN	60.0	60.0
5	SPY-3C (MINI-SPY)	W456	0.0	18.0	18.0	UNKNOWN	62.0	62.0
26	AQS-13F ACTIVE HELO DIPPING SONAR [ON SH	W460	14.1	0.2	14.3	25.8	30.6	25.8
7	SQR-19 TACTAS	W462	0.0	14.1	14.1	UNKNOWN	25.8	25.8
9	SLQ-32(V)3 ACTIVE/PASSIVE ECM	W472	0.0	3.0	3.0	UNKNOWN	51.0	51.0
8	SLQ-25 NIXIE	W473	0.0	3.6	3.6	UNKNOWN	22.8	22.8
16	OPER READINESS AND TEST SYS	W491	2.6	3.0		-6.8	32.5	
38	ADMIN LAN			0.7	6.3		30.0	33.7
12	SENSOR COOLING SYSTEMS	W532	UNKNOWN	UNKNOWN	4.0	UNKNOWN	10.0	47.5
17	RAST/TALON HELO COMBO	W588	0.0	5.0		UNKNOWN	32.8	
18	RAST CONTROL STATION			0.0	5.0		0.0	32.8
20	1X MK45 5IN/54 GUN	W710	0.0	24.1		UNKNOWN	23.7	
21	1X 40MM CIWS/MULTI PURP GUN			6.1			34.7	
22	1X 40MM CIWS/MULTI PURP GUN			6.1	36.3		32.3	27.0
23	1.25 MK41 VLS MISSILE LAUNCHER (LOADED)	W721	0.0	157.0	157.0	UNKNOWN	16.7	16.7
25	2X MK32 SVTT ON DECK	W750	0.0	2.7	2.7	UNKNOWN	2.5	2.5
41	AIRCRAFT RELATED WEAPONS	W780	0.0	1.4	1.4	UNKNOWN	28.3	28.3
28	5IN/54 AMMO 400 RDS	WF21	0.0	22.0		UNKNOWN	9.0	
29	40MM AMMO (MIXED) 3000 RNDS			7.4			24.7	
32	40MM AMMO (MIXED) -- 3000 RNDS			7.4			-7.0	
33	MK46 LIGHTWEIGHT ASW TORPEDOES -- 6 RDS			1.4	38.2		3.0	8.7
34	HELO AS565 PANTHER: (DOLPHIN)	WF23	0.0	4.4	4.4	UNKNOWN	5.0	5.0
19	LAMPS MKIV: AVIATION SUPPORT & SPARES	WF26	0.0	2.0	2.0	UNKNOWN	33.8	33.8
37	LAMPS MKIII: FUEL [JP-5]	WF42	0.0	63.8	63.8	UNKNOWN	9.8	9.8

PRINTED REPORT NO. 11 - P+A WEIGHTS AND VCGS

ROW	P+A NAME	P+A WT KEY	WEIGHT ADD	WEIGHT FAC,LTON	VCG KEY	VCG ADD,FT	VCG FAC
1	CIC COMMAND AND DECISION MODFIG	W410	7.00	0.00	D6.5	-7.22	0.00
11	CS HOLD UP BATTERY	W410	30.00	0.00	BL	3.50	1.00
3	NAV SYS (1/2 DDG 51)	W420	3.80	-1.00	D10	16.00	1.00
2	EXCOMM (1/2 DDG51)	W440	16.00	0.00	D10	-8.20	1.00
4	SPS-67 SSR	W451	1.75	0.00	D10	29.50	1.00
6	MK XII AIMS IFF	W455	2.30	0.00	D10	30.00	1.00

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  5  SPY-3C (MINI-SPY)
      W456     18.00     0.00      DM10      32.00      1.00
 26  AQS-13F ACTIVE HELO DIPPING SONAR [ON SH
      W460      0.20     0.00      BL        30.56      0.00
  7  SQR-19 TACTAS
      W462     14.10     0.00      D20       -5.00      1.00
  9  SLQ-32(V)3 ACTIVE/PASSIVE ECM
      W472      3.00     0.00      D10       21.00      1.00
  8  SLQ-25 NIXIE
      W473      3.60     0.00      D20       -8.00      1.00
 16  OPER READINESS AND TEST SYS
      W491      3.00     0.00      D10        2.50      1.00
 38  ADMIN LAN
      W491      0.70     0.00      BL        30.00      0.00
 12  SENSOR COOLING SYSTEMS
      W532      4.00    -1.00      BL        10.00      1.00
 17  RAST/TALON HELO COMBO
      W588      5.00     0.00      D20        2.00      1.00
 18  RAST CONTROL STATION
      W588      0.00     0.00      D20        0.00      0.00
 20  1X MK45 5IN/54 GUN
      W710     24.10     0.00      D6.5      -8.00      1.00
 21  1X 40MM CIWS/MULTI PURP GUN
      W710      6.10     0.00      D6.5       3.00      1.00
 22  1X 40MM CIWS/MULTI PURP GUN
      W710      6.10     0.00      D15        3.00      1.00
 23  1.25 MK41 VLS MISSILE LAUNCHER (LOADED)
      W721    157.00     0.00      D6.5     -15.00      1.00
 25  2X MK32 SVTT ON DECK
      W750      2.70     0.00      D15        2.50      0.00
 41  AIRCRAFT RELATED WEAPONS
      W780      1.40     0.00      BL        28.30      0.00
 28  5IN/54 AMMO 400 RDS
      WF21     22.00     0.00      BL         9.00      1.00
 29  40MM AMMO (MIXED) 3000 RNDS
      WF21      7.40     0.00      D6.5      -7.00      1.00
 32  40MM AMMO (MIXED) -- 3000 RNDS
      WF21      7.40     0.00      D15       -7.00      0.00
 33  MK46 LIGHTWEIGHT ASW TORPEDOES -- 6 RDS
      WF21      1.40     0.00      D15        3.00      0.00
 34  HELO AS565 PANTHER: (DOLPHIN)
      WF23      4.40     0.00      D20        5.00      0.00
 19  LAMPS MKIV: AVIATION SUPPORT & SPARES
      WF26      2.00     0.00      D20        3.00      1.00
 37  LAMPS MKIII: FUEL [JP-5]
      WF42     63.80     0.00      BL         9.84      0.00

ASSET/MONOSC VERSION 3.3+ - SPACE MODULE - 2/11/95  10.49.47.

** WARNING - SPACE MODULE ** (W-TOTALAREAINADQ-SPACE)
 THE REQUIRED ARRANGEABLE AREA FOR THE TOTAL SHIP EXCEEDS
 THE AVAILABLE ARRANGEABLE AREA WITHIN THE TOTAL SHIP.

 PRINTED REPORT NO.  1 - SUMMARY

 COLL PROTECT SYSTEM-PRESENT              HAB STANDARD-NAVY
 SONAR DOME-NONE                          UNIT COMMANDER-NONE

 FULL LOAD WT, LTON        3980.1       HAB STANDARD FAC              0.000
 TOTAL CREW ACC              122.       PASSWAY MARGIN FAC            0.000
 HULL AVG DECK HT, FT       10.57       AC MARGIN FAC                 0.200
 MR VOLUME, FT3            49678.       SPACE MARGIN FAC              0.050
                                     AREA FT2                    VOL FT3
                          PAYLOAD    TOTAL      TOTAL            TOTAL
                          REQUIRED   REQUIRED   AVAILABLE        ACTUAL
                          --------   --------   ---------        --------
 DKHS ONLY                   891.0     4850.6    10911.7         110686.
 HULL OR DKHS               3505.0    36769.7    29486.0         388003.
                          --------   --------   ---------        --------
 TOTAL                      4396.0    41620.3    40397.7         498689.

                                  TOTAL      DKHS     PERCENT
 SSCS    GROUP                  AREA FT2   AREA FT2   TOTAL AREA
 -------------                  --------   --------   ----------
  1. MISSION SUPPORT              6272.0     1508.5      15.1
  2. HUMAN SUPPORT                7923.7      381.5      19.0
  3. SHIP SUPPORT                12407.7     1651.8      29.8
  4. SHIP MOBILITY SYSTEM        13035.0     1077.8      31.3
  5. UNASSIGNED                   1981.9      231.0       4.8
                                --------   --------   ----------
                    TOTAL        41620.3     4850.6     100.0
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PRINTED REPORT NO. 2 - MISSION SUPPORT AREA

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2
1.	MISSION SUPPORT	6272.0	1508.5
1.1	COMMAND,COMMUNICATION+SURV	2974.4	1305.0
1.11	EXTERIOR COMMUNICATIONS	730.0	95.0
*1.111	RADIO	730.0	95.0
1.112	UNDERWATER SYSTEMS		
1.12	SURVEILLANCE SYS	670.0	470.0
*1.121	SURFACE SURV (RADAR)	670.0	470.0
1.122	UNDERWATER SURV (SONAR)		
1.13	COMMAND+CONTROL	1008.0	608.0
*1.131	COMBAT INFO CENTER	400.0	
1.132	CONNING STATIONS	608.0	608.0
1.1321	PILOT HOUSE	528.0	528.0
1.1322	CHART ROOM	80.0	80.0
1.14	COUNTERMEASURES	192.0	132.0
*1.141	ELECTRONIC	172.0	132.0
*1.142	TORPEDO	20.0	
1.143	MISSILE		
1.15	INTERIOR COMMUNICATIONS	344.1	
1.16	ENVIRONMENTAL CNTL SUP SYS	30.3	
1.2	WEAPONS	1779.0	144.0
*1.21	GUNS	879.0	144.0
*1.22	MISSILES	900.0	
1.23	ROCKETS		
1.24	TORPEDOS		
1.25	DEPTH CHARGES		
1.26	MINES		
1.27	MULT EJECT RACK STOW		
1.28	WEAP MODULE STA & SERV INTER		
1.3	AVIATION	625.0	50.0
1.31	AVIATION LAUNCH+RECOVERY	25.0	
1.311	LAUNCHING+RECOVERY AREAS		
*1.312	LAUNCHING+RECOVERY EQUIP	25.0	
1.32	AVIATION CONTROL		
1.321	FLIGHT CONTROL		
1.322	NAVIGATION		
1.323	OPERATIONS		
1.33	AVIATION HANDLING		
*1.34	AIRCRAFT STOWAGE	450.0	
1.35	AVIATION ADMINISTRATION		
*1.36	AVIATION MAINTENANCE	50.0	50.0
1.37	AVIATION ORDINANCE		
1.372	CONTROL		
1.373	HANDLING		
1.374	STOWAGE		
1.38	AVIATION FUEL SYS		
*1.39	AVIATION STORES	100.0	
1.4	AMPHIBIOUS		
1.5	CARGO		
1.6	INTERMEDIATE MAINT FAC	731.7	
1.64	STOWAGE	731.7	
1.641	WEAPONS	731.7	
1.7	FLAG FACILITIES		
1.73	HANDLING		
1.74	STOWAGE		
1.8	SPECIAL MISSIONS		
1.9	SM ARMS,PYRO+SALU BAT	161.9	9.5
1.91	SM ARMS (LOCKER)	41.4	
1.92	PYROTECHNICS (LOCKER)	9.5	9.5
1.93	SALUTING BAT (MAGAZINE)	14.0	
1.95	SECURITY FORCE EQUIP	97.1	

PRINTED REPORT NO. 3 - HUMAN SUPPORT AREA

HAB STD = NAVY

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2
2.	HUMAN SUPPORT	7923.7	381.5
2.1	LIVING	4403.5	340.0
2.11	OFFICER LIVING	1565.0	340.0
2.111	BERTHING	1360.0	260.0
2.1111	SHIP OFFICER	1360.0	260.0
2.1115	FLAG OFFICER		
2.112	SANITARY	205.0	80.0
2.1121	SHIP OFFICER	205.0	80.0

2.1125	FLAG OFFICER		
2.12	CPO LIVING	592.5	
2.121	BERTHING	465.0	
2.122	SANITARY	127.5	
2.13	CREW LIVING	2097.0	
2.131	BERTHING	1800.0	
2.132	SANITARY	297.0	
2.133	RECREATION		
2.1332	LIBRARY		
2.14	GENERAL SANITARY FACILITIES	110.0	
2.141	LADIES RETIRING ROOM	80.0	
2.142	BRIDGE WASHROOM+WC	15.0	
2.143	DECK WASHROOM+WC	15.0	
2.15	SHIP RECREATION FAC	39.0	
2.152	MOTION PIC FILM+EQUIP	24.4	
2.153	PHYSICAL FITNESS	14.6	
2.154	TV ROOM		
2.16	TRAINING		
2.2	COMMISSARY	2316.7	
2.21	FOOD SERVICE	1448.0	
2.211	OFFICER (MESS+LOUNGE)	496.6	
2.212	CPO (MESS+LOUNGE)	394.0	
2.213	CREW (MESS+LOUNGE)	557.4	
2.22	COMMISSARY SERVICE SPACES	544.6	
2.23	FOOD STORAGE+ISSUE	324.2	
2.231	CHILL PROVISIONS	79.4	
2.232	FROZEN PROVISIONS	77.7	
2.233	DRY PROVISIONS	167.0	
2.234	ISSUE		
2.3	MEDICAL+DENTAL (MEDICAL)	300.0	
2.4	GENERAL SERVICES	523.2	
2.41	SHIP STORE FACILITIES	244.6	
2.411	SHIP STORE	61.0	
2.416	SHIP STORE STORES	183.6	
2.42	LAUNDRY FACILITIES	186.7	
2.43	DRY CLEANING		
2.44	BARBER SERVICE	80.0	
2.46	POSTAL SERVICE		
2.47	BRIG		
2.48	RELIGIOUS	12.0	
2.5	PERSONNEL STORES	150.4	41.5
2.51	BAGGAGE	21.4	
2.52	MESSROOM STORES	59.0	11.5
2.55	FOUL WEATHER GEAR (LOCKER)	30.0	30.0
2.57	FOLDING CHAIR STOREROOM	40.0	
2.6	CBR PROTECTION	209.8	
2.61	CBR DECON STATIONS		
2.62	CBR DEFENSE EQP STRMS	209.8	
2.63	CPS AIRLOCKS		
2.7	LIFESAVING EQUIPMENT	20.0	
2.71	LIFEJACKET LOCKER	20.0	

PRINTED REPORT NO. 4 - SHIP SUPPORT AREA

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2
3.	SHIP SUPPORT	12407.7	1651.8
3.1	SHIP CNTL SYS(STEERING&DIVING)	564.0	
3.2	DAMAGE CONTROL	375.5	
3.22	REPAIR STATIONS	182.0	
3.25	FIRE FIGHTING	193.5	
3.3	SHIP ADMINISTRATION	972.4	
3.5	DECK AUXILIARIES	696.6	212.9
3.51	ANCHOR HANDLING	309.2	
3.52	LINE HANDLING	174.5	
3.53	TRANSFER-AT-SEA	212.9	212.9
3.6	SHIP MAINTENANCE	1143.0	
3.61	ENGINEERING DEPT	699.1	
3.611	AUX (FILTER CLEANING)	90.0	
3.612	ELECTRICAL	99.7	
3.613	MECH (GENERAL WK SHOP)	449.3	
3.614	PROPULSION MAINTENANCE	60.0	
3.62	OPERATIONS DEPT (ELECT SHOP)	314.1	
3.63	WEAPONS DEPT (ORDINANCE SHOP)	59.8	
3.64	DECK DEPT (CARPENTER SHOP)	70.0	
3.7	STOWAGE	2173.1	
3.71	SUPPLY DEPT	1640.9	
3.711	HAZARDOUS MATL	146.0	
3.712	SPECIAL CLOTHING	46.1	
3.713	GEN USE CONSUM+REPAIR PART	933.2	

3.714	MISCELLANEOUS	37.1	
3.715	STORES HANDLING	478.6	
3.72	ENGINEERING DEPT	30.7	
3.73	OPERATIONS DEPT	42.8	
3.74	DECK DEPT (BOATSWAIN STORES)	379.3	
3.75	WEAPONS DEPT	27.3	
3.76	EXEC DEPT (MASTER-AT-ARMS STOR)	31.7	
3.78	CLEANING GEAR STOWAGE	20.5	
3.8	ACCESS (INTERIOR-NORMAL)	6483.0	1438.9

PRINTED REPORT NO. 5 - SHIP MACHINERY SYSTEM AREA

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2
4.	SHIP MACHINERY SYSTEM	13035.0	1077.8
4.1	PROPULSION SYSTEM	2421.3	390.4
4.13	INTERNAL COMBUSTION	679.3	69.6
4.132	COMBUSTION AIR		
4.133	EXHAUST	139.3	69.6
4.134	CONTROL	540.0	
4.14	GAS TURBINE	1742.0	320.7
4.142	COMBUSTION AIR	277.2	138.6
4.143	EXHAUST	524.8	182.1
4.144	CONTROL	940.0	
4.17	AUX PROPULSION SYSTEMS		
4.2	PROPULSOR & TRANSMISSION SYST		
4.3	AUX MACHINERY	10613.7	687.5
4.31	GENERAL (AUX MACH DELTA)	8419.9	
4.32	A/C & REFRIGERATION	1439.9	687.5
4.321	A/C (INCL VENT)	1342.7	687.5
4.322	REFRIGERATION	97.2	
4.33	ELECTRICAL	270.1	
4.331	POWER GENERATION	143.1	
4.3311	SHIP SERVICE PWR GEN		
4.3314	400 HERTZ	143.1	
4.332	PWR DIST & CNTRL	2.0	
4.334	DEGAUSSING	125.0	
4.34	POLUTION CONTROL SYSTEMS	134.4	
4.35	MECHANICAL SYSTEMS	349.3	

PRINTED REPORT NO. 6 - REQUIRED TANKAGE

POLLUTION CNTRL IND-PRESENT

ENDURANCE FUEL, FT3	18305.
AVIATION FUEL, FT3	2814.
FRESH WATER, FT3	653.
SEWAGE, FT3	245.
WASTE OIL WATER, FT3	366.
CLEAN BALLAST, FT3	0.
TANKAGE MARGIN, FT3	0.
TANKAGE VOL REQ, FT3	22382.

ASSET/MONOSC VERSION 3.3+ - DESIGN SUMMARY - 2/11/95 10.50.12.

PRINTED REPORT NO. 1 - SUMMARY

SHIP COMMENT TABLE

PRINCIPAL CHARACTERISTICS - FT	
LBP	380.0
LOA	398.4
BEAM, DWL	51.0
BEAM, WEATHER DECK	54.6
DEPTH @ STA 10	30.0
DRAFT TO KEEL DWL	15.5
DRAFT TO KEEL LWL	15.5
FREEBOARD @ STA 3	18.9
GMT	5.6
CP	0.570
CX	0.795

SPEED(KT): MAX= 26.1 SUST= 25.0
ENDURANCE: 6000.0 NM AT 14.0 KTS

TRANSMISSION TYPE: ELECT
MAIN ENG: 2 RGT @ 15901.8 HP

SHAFT POWER/SHAFT: 14387.5 HP
PROPELLERS: 2 - FP - 11.7 FT DIA

SEP GEN: 2 D DIESEL @ 2868.0 KW

24 HR LOAD	1141.9
MAX MARG ELECT LOAD	2754.9

	OFF	CPO	ENL	TOTAL
MANNING	15	13	82	110
ACCOM	17	15	90	122

WEIGHT SUMMARY - LTON	
GROUP 1 - HULL STRUCTURE	1320.9
GROUP 2 - PROP PLANT	281.3
GROUP 3 - ELECT PLANT	261.7
GROUP 4 - COMM + SURVEIL	144.9
GROUP 5 - AUX SYSTEMS	494.2
GROUP 6 - OUTFIT + FURN	314.0
GROUP 7 - ARMAMENT	209.6
SUM GROUPS 1-7	3026.7
DESIGN MARGIN	378.3
LIGHTSHIP WEIGHT	3405.0
LOADS	575.1
FULL LOAD DISPLACEMENT	3980.1
FULL LOAD KG: FT	19.7
MILITARY PAYLOAD WT - LTON	410.5
USABLE FUEL WT - LTON	394.3

AREA SUMMARY - FT2	
HULL AREA -	29486.0
SUPERSTRUCTURE AREA -	10911.7
TOTAL AREA	40397.7

VOLUME SUMMARY - FT3	
HULL VOLUME -	388003.2
SUPERSTRUCTURE VOLUME -	110685.5
TOTAL VOLUME	498688.7

PRINTED REPORT NO. 2 - MANNING AND ACCOMMODATION SUMMARY

CREW ACCOM MARGIN FAC 0.10

	SHIPS CREW	AIR DETACH	FLAG STAFF /OTHER	TOTAL MANNING	TOTAL ACCOMMODATION
OFFICERS	11.	4.	0.	15.	17.
CPO	12.	1.	0.	13.	15.
OEM	76.	6.	0.	82.	90.
TOTAL	99.	11.	0.	110.	122.

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PRINTED REPORT NO. 3 - INDICATORS

MISSION
  DESIGN MODE IND-ENDURANCE
  ENDUR DISP IND -AVG DISP
  ENDUR DEF IND  -USN
  SUSTN SPEED IND-GIVEN
  ENDUR SPEED IND-GIVEN
HULL FORM FACTORS
  HULL OFFSETS IND-GENERATE
  HULL DIM IND    -B+T
HULL BOUNDARY CONDITIONS
  HULL BC IND     -CONV DD
  HULL STA IND    -OPTIMUM
SHELL APPENDAGES
  BILGE KEEL IND -PRESENT
  SKEG IND        -PRESENT
MARGIN LINE
  MARGIN LINE IND-CALC
HULL SUBDIVISION FACTORS
  HULL SUBDIV IND-CALC
INNER BOTTOM
  INNER BOTTOM IND-PRESENT
HULL LOADS
  HULL LOADS IND -CALC
  SHOCK FNDTN IND-SHOCK
STRUCTURAL ARANGEMENT
  BOT PLATE LIMIT IND-CALC
STIFFENERS
  STIFFENER SHAPE IND-CALC
DKHS GEOM FACTORS
  DKHS GEOM IND  -GENERATE
  DKHS SIZE IND  -AUTO X
DKHS MATERIALS
  DKHS MTRL TYPE IND-HTS
  FIRE PROTECT IND  -NONE
DKHS LOADS
  BLAST RESIST IND-7 PSI
ARRANGEMENT TYPES
  MECH CL ARR IND   -
  MECH PORT ARR IND -
  MECH STBD ARR IND -
  ELECT PG ARR 1 IND-M-PG
  ELECT PG ARR 2 IND-
  ELECT DL ARR IND  -MTR
ARRANGEMENT CG
  MACHY KG IND   -CALC
ENGINE CONFIG FACTORS
  ENG ENDUR RPM IND    -CALC
  SEC ENG USAGE IND    -
  ENDUR CONFIG IND     -NO TS
  GT ENG ENCL IND      -84 DBA
  DIESEL ENG MOUNT IND-COMPOUND
MAIN ENGINES
  MAIN ENG SELECT IND-GIVEN
  MAIN ENG MOD IND -GE-LM1600-VAN2
  MAIN ENG TYPE IND  -RGT
  MAIN ENG SFC EQ IND-POLY QN
  MAIN ENG SIZE IND  -CALC
SEC ENGINES
  SEC ENG SELECT IND -
  SEC ENG MODEL IND  -
  SEC ENG TYPE IND   -
  SEC ENG SFC EQN IND-
  SEC ENG SIZE IND   -
TRANSMISSION FACTORS
  TRANS TYPE IND -ELECT
  TRANS EFF IND  -CALC
ELECTRICAL TRANSMISSION
  ELECT PRPLN TYPE IND  -ACR-DCS
  ELECT PRPLN RATIND IND-CALC
  AC SYNC ROTOR COOL IND-AIR
  TRANS LINE NODE PT IND-CALC
  SWITCHGEAR TYPE IND   -ADV

GEARS
  SEC ENG 2 SPD GEAR IND-
  GEAR IMPED MASS IND    -NONE
PROPULSION SHAFTING
  SHAFT SUPPORT TYPE IND-POD
  SHAFT SYS SIZE IND     -CALC
PROPULSION SHAFT BEARING
  THRUST BRG LOC IND-CALC
PROPELLER FACTORS
  PROP TYPE IND  -FP
  PROP SERIES IND-ANALYTIC
  PROP DIA IND   -CALC
  PROP AREA IND  -CALC
  PROP LOC IND   -CALC
  PITCH RATIO IND-CALC
OPEN WATER PROP DATA
  PROP ID IND    -
PROPULSION SUPPORT SYS
  INLET TYPE IND      -PLENUM
  DUCT SILENCING IND -BOTH
  EXHAUST IR SUPP IND-PRESENT
SS GENERATOR FACTORS
  SS SYS TYPE IND-SEP
  FREQ CONV IND  -
SS GENERATOR SIZE
  SS GEN SIZE IND-NON STD
SS ENGINES
  SS ENG SELECT IND -GIVEN
  SS ENG MODEL IND  -A-12V270
  SS ENG TYPE IND   -D DIESEL
  SS ENG SFC EQN IND-DIESEL
  SS ENG SIZE IND   -CALC
SONAR SYSTEM
  SONAR DOME IND -NONE
  SONAR DRAG IND -
CLIMATE CONTROL


  COLL PROTECT SYS IND-PRESENT
  REFER MACHY LOC IND -OUTSIDE
  AUX BOILER TYPE IND -ELECTRIC
SEA WATER SYSTEMS

AIR AND MISC FLUID SYSTEM

RUDDERS
  RUDDER SIZE IND-CALC
  RUDDER TYPE IND-SPADE
ROLL FINS
  FIN SIZE IND   -CALC
REPLENISHMENT SYSTEMS

SPECIAL PURPOSE SYSTEMS
  POLLUTION CNTL IND-PRESENT
OUTFIT AND FURNISHINGS
  UNIT CMDR IND    -NONE


FUELS AND LUBRICANTS
  SHIP FUEL TYPE IND-JP-5
RESISTANCE FACTORS
  FRICTION LINE IND    -ITTC
  RESID RESIST IND     -NRC
  WORM CURVE IND       -
  PRPLN SYS RESIST IND-CALC
SHIP WEIGHT
  SHIP LCG INPUT IND-CALC
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PRINTED REPORT NO. 4 - MARGINS

HULL	
MIN FREEBOARD MARGIN, FT	.25
HULL MARGIN STRESS, KSI	2.24
PROPULSION PLANT	
TORQUE MARGIN FAC	1.200
ELECTRIC PLANT	
ELECT LOAD DES MARGIN FAC	.200
ELECT LOAD SL MARGIN FAC	.100
AUXILIARY SYSTEMS	
AC MARGIN FAC	.200
OUTFIT AND FURNISHINGS	
CREW ACCOM MARGIN FAC	.100
WEIGHT MARGINS	
GROWTH WT MARGIN, LTON	.0
D+B WT MARGIN, LTON	.0
D+B WT MARGIN FAC	.125
D+B KG MARGIN, FT	.00
D+B KG MARGIN FAC	.125
RESISTANCE FACTORS	
DRAG MARGIN FAC	.080
SPACE FACTORS	
SPACE MARGIN FAC	.050
PASSWAY MARGIN FAC	.000
TANKAGE MARGIN FAC	.000

PRINTED REPORT NO. 5 - PAYLOAD AND ADJUSTMENTS

ROW	PAYLOAD AND ADJUSTMENT NAME
1	CIC COMMAND AND DECISION MODFIG
2	EXCOMM (1/2 DDG51)
3	NAV SYS (1/2 DDG 51)
4	SPS-67 SSR
5	SPY-3C (MINI-SPY)
6	MK XII AIMS IFF
7	SQR-19 TACTAS
8	SLQ-25 NIXIE
9	SLQ-32(V)3 ACTIVE/PASSIVE ECM
11	CS HOLD UP BATTERY
12	SENSOR COOLING SYSTEMS
16	OPER READINESS AND TEST SYS
17	RAST/TALON HELO COMBO
18	RAST CONTROL STATION
19	LAMPS MKIV: AVIATION SUPPORT & SPARES
20	1X MK45 5IN/54 GUN
21	1X 40MM CIWS/MULTI PURP GUN
22	1X 40MM CIWS/MULTI PURP GUN
23	1.25 MK41 VLS MISSILE LAUNCHER (LOADED)
24	LONGITUDNAL BULKHEADS AROUND MAGAZINE
25	2X MK32 SVTT ON DECK
26	AQS-13F ACTIVE HELO DIPPING SONAR [ON SH
28	5IN/54 AMMO 400 RDS
29	40MM AMMO (MIXED) 3000 RNDS
32	40MM AMMO (MIXED) -- 3000 RNDS
33	MK46 LIGHTWEIGHT ASW TORPEDOES -- 6 RDS
34	HELO AS565 PANTHER: (DOLPHIN)
37	LAMPS MKIII: FUEL [JP-5]
38	ADMIN LAN
41	AIRCRAFT RELATED WEAPONS
42	AVIATION STORES
44	MINE DETECTION HULL MOUNTED SONAR

PRINTED REPORT NO. 3 - DETAILED MISSION PERFORMANCE

SIG WAVE HT, FT = 0.0
PROBABILITY OF OCCURANCE, PCNT = 1.7

SPEED KT	PROBABILITY PCNT	DRAG LBF	REQ PROP HP	FUEL CONS NM/LTON
6.0	11.9	11627.	330.	18.0
14.0	46.6	55140.	3600.	17.5
20.0	35.6	110889.	10349.	11.3
25.0	4.4	211746.	25441.	6.1
26.0	1.5	250371.	31804.	5.0

SIG WAVE HT, FT = 4.0
PROBABILITY OF OCCURANCE, PCNT = 15.7

SPEED KT	PROBABILITY PCNT	DRAG LBF	REQ PROP HP	FUEL CONS NM/LTON
6.0	11.9	11654.	331.	18.0
14.0	46.6	55266.	3609.	17.4
20.0	35.6	111141.	10375.	11.2
25.0	4.4	212227.	25507.	6.1
26.0	1.5	250442.	31804.	5.0

SIG WAVE HT, FT = 6.5
PROBABILITY OF OCCURANCE, PCNT = 11.6

SPEED KT	PROBABILITY PCNT	DRAG LBF	REQ PROP HP	FUEL CONS NM/LTON
6.0	11.9	11716.	333.	17.9
14.0	46.6	55562.	3630.	17.4
20.0	35.6	111738.	10436.	11.2
25.0	4.4	213366.	25663.	6.1
26.0	1.5	250736.	31804.	5.0

SIG WAVE HT, FT = 10.2
PROBABILITY OF OCCURANCE, PCNT = 42.0

SPEED KT	PROBABILITY PCNT	DRAG LBF	REQ PROP HP	FUEL CONS NM/LTON
6.0	11.9	11902.	339.	17.9
14.0	46.6	56442.	3694.	17.2
20.0	35.6	113507.	10619.	11.0
25.0	4.4	216745.	26129.	6.0
25.9	1.5	251230.	31804.	5.0

SIG WAVE HT, FT = 17.0
PROBABILITY OF OCCURANCE, PCNT = 29.0

SPEED KT	PROBABILITY PCNT	DRAG LBF	REQ PROP HP	FUEL CONS NM/LTON
6.0	11.9	12612.	362.	17.7
14.0	46.6	59809.	3938.	16.5
20.0	35.6	120277.	11326.	10.4
25.0	4.4	229673.	27930.	5.6
25.6	1.5	253071.	31804.	5.0

ASSET/MONOSC VERSION 3.3+ - SEAKEEPING ANALYSIS - 2/11/95 10.51.01.

PRINTED REPORT NO. 1 - SUMMARY

APPENDAGE IND-WITH

FULL LOAD WT, LTON 3980.1

	FULL LOAD
BALES RANK	
RANK OF THE SYNTHESIZED SHIP (ACTUAL DISP)	1.975
RANK OF THE SYNTHESIZED SHIP (NORMALIZED)	2.743
RANK OF THE CLOSEST DATA BASE HULL (NORMALIZED)	2.730
ID NO OF CLOSEST DATA BASE SHIP	4
MCCREIGHT RANK	
RANK OF THE SYNTHESIZED SHIP (ACTUAL SHIP)	4.464
RANK OF THE CLOSEST DATA BASE HULL	4.402
ID NO OF CLOSEST DATA BASE SHIP	32

PRINTED REPORT NO. 2 - SHIP GEOMETRY DATA

FULL LOAD WT, LTON 3980.1

	FULL LOAD
ACTUAL SHIP	
LBP, FT	380.00
BEAM, FT	50.53
DRAFT, FT	15.50
VERT PRISMATIC COEF (FWD)	0.7334
VERT PRISMATIC COEF (AFT)	0.5414
WATERPLANE COEF (FWD)	0.5865
WATERPLANE COEF (AFT)	0.8958
WP AREA AFT MIDSHIPS, FT2	8599.97
LCB FROM FP, FT	197.93
LCF FROM FP, FT	217.03
BML, FT	856.32
CUT-UP PT FROM FP, FT	32.13
NORMALIZED SHIP	
DISP, LTON	4232.1
LBP, FT	387.86
BEAM, FT	51.57
DRAFT, FT	15.82
CUT-UP PT FROM FP, FT	32.80

ASSET/MONOSC VERSION 3.3+ - COST ANALYSIS - 2/11/95 10.51.20.

** WARNING - COST ANALYSIS ** (W-DEFAULTVALUES-CSTMPL)
THE FOLLOWING PARAMETERS WERE PROVIDED DEFAULT VALUES:

PAYLOAD T+E COST	LEAD PAYLOAD COST
FOLLOW PAYLOAD COST	ANNUAL TRNG ORD COST
PAYLOAD FUEL RATE	TECH ADV COST
ADDL FACILITY COST	DEFERRED MMHRS REQ
UNREP UNIT CAPACITY	UNREP UNIT COST
UNREP O+S COST	KN FACTOR ARRAY
SHIP FUEL RATE	

NOTE-THIS INTERIM MODULE PROVIDES GUIDANCE FOR DECISIONS REGARDING SHIP DESIGN TRADEOFFS AND COMPARATIVE EVALUATIONS. REQUESTS FOR ESTIMATES OF SHIP COSTS FOR BUDGETARY PURPOSES SHOULD BE DIRECTED TO NAVSEA.

PRINTED REPORT NO. 1 - SUMMARY

YEAR $	1995.	NO OF SHIPS ACQUIRED	100.
INFLATION ESCALATION FAC	1.513	SERVICE LIFE, YR	30.0
LEARNING RATE	0.970	ANNUAL OPERATING HRS	3000.0
FUEL COST, $/GAL	1.000	MILITARY P/L, LTON	410.5
PAYLOAD FUEL RATE, LTON/HR	0.33	LIGHTSHIP WT, LTON	3405.0
SHIP FUEL RATE, LTON/HR	0.92	FULL LOAD WT, LTON	3980.1

COST ITEM	COSTS(MILLIONS OF DOLLARS) TOT SHIP	+ PAYLOAD	= TOTAL
LEAD SHIP	529.7	223.2*	752.9
FOLLOW SHIP	249.9	198.6*	448.6
AVG ACQUISITION COST/SHIP(** SHIPS)	217.2	198.9*	416.1
LIFE CYCLE COST/SHIP(30 YEARS)			1117.6
TOTAL LIFE CYCLE COST(30 YEARS)			111758.1
DISCOUNTED LIFE CYCLE COST/SHIP			67.4**
DISCOUNTED TOTAL LIFE CYCLE COST			6743.3**

*ESTIMATED VALUE
**DISCOUNTED AT 10 PERCENT

PRINTED REPORT NO. 2 - UNIT ACQUISITION COSTS

SWBS GROUP		UNITS	INPUTS	KN FACTORS	LEAD SHIP COSTS $K	FOLLOW SHIP COSTS $K
100	HULL STRUCTURE	LTON	1320.9	1.00	13179.	12388.
200	PROPULSION PLANT	HP	31803.6	2.35	28667.	26947.
300	ELECTRIC PLANT	LTON	261.7	1.00	17999.	16919.
400	COMMAND+SURVEILLANCE	LTON	144.9	3.15	11157.	10488.
500	AUX SYSTEMS	LTON	494.2	1.53	28027.	26345.
600	OUTFIT+FURNISHINGS	LTON	314.0	1.00	13527.	12715.
700	ARMAMENT	LTON	209.6	1.00	2478.	2330.
	MARGIN	LTON	378.3		14379.	13516.
800	DESIGN+ENGINEERING			26.06	197272.	21798.
900	CONSTRUCTION SERVICES			4.25	34052.	32009.
	TOTAL CONSTRUCTION COST				360737.	175455.
	CONSTRUCTION COST				360737.	175455.
	PROFIT(10.0 PERCENT OF CONSTRUCTION COST)				36074.	17546.
	PRICE				396811.	193001.
	CHANGE ORDERS(12/8 PERCENT OF PRICE)				47617.	15440.
	NAVSEA SUPPORT(2.5 PERCENT OF PRICE)				9920.	4825.
	POST DELIVERY CHARGES(5 PERCENT OF PRICE)				19841.	9650.
	OUTFITTING(4 PERCENT OF PRICE)				15872.	7720.
	H/M/E + GROWTH(10 PERCENT OF PRICE)				39681.	19300.
	TOTAL SHIP COST				529742.	249936.
	ESTIMATED PAYLOAD COST				223202.	198643.
	SHIP PLUS PAYLOAD COST				752944.	448579.

ADJUSTED FIRST UNIT SHIP COST, $K 265889.1
COMBAT SYSTEM WEIGHT, LTON 410.5
PROPULSION SYSTEM WEIGHT, LTON 281.3
ADJUSTED FIRST UNIT SHIP COST EQUALS
FOLLOW SHIP TOTAL COST DIVIDED BY 0.940

PRINTED REPORT NO. 3 - LIFE CYCLE COSTS

IOC YEAR	2010.	PAYLOAD FUEL RATE, LTON/HR	0.33
R+D PROGRAM LENGTH, YRS	10.	SHIP FUEL RATE, LTON/HR	0.92
NUMBER OF SHIPS ACQUIRED	100.	TECH ADV COST, $M	0.00
SERVICE LIFE, YRS	30.	ADDL FACILITY COST, $M	0.00
NO OF OFFICERS/SHIP	15.	DEFERRED MMHRS REQ, HR/WK	0.
NO OF ENLISTED MEN/SHIP	95.	PRODUCTION RATE, SHIPS/YR	8.00

30 - YEAR SYSTEMS COST

(MILLIONS OF YEAR 1995 DOLLARS)

COST ELEMENT	SHIP NONREC	PAYLOAD NONREC	OTHER NONREC	TOTAL NONREC	SYSTEM RECUR	TOTAL SYSTEM
R+D TOTAL	594.	41.	0.	634.		634.
DESIGN+DEVELMNT	185.		0.	185.		185.
TEST+EVALUATION	409.	41.	0.	450.		450.
INVESTMENT	23455.	26452.	50.	49958.		49958.
EQUIPMENT	22804.	23867.		46670.		46670.
PRIME	21718.	19889.		41607.		41607.
SUPPORT	1086.	3978.		5064.		5064.
FACILITIES			0.	0.		0.
INITIAL SPARES	652.	2586.		3237.		3237.
ASSOCIATED SYS			50.	50.		50.
OPERATIONS+SUPPRT					63907.	63907.
PERSONNEL					6757.	6757.
OPERATIONS					6123.	6123.
MAINTENANCE					19386.	19386.
ENERGY					2827.	2827.
REPL SPARES					21041.	21041.
MAJOR SUPPORT					7589.	7589.
ASSOCIATED SYS					184.	184.
LESS RESIDUAL VALUE						2741.
LIFE CYCLE TOTAL SYSTEMS COST						111758.
DISCOUNTED AT 10 PERCENT						6743.

COST PER VEHICLE-UNDISCOUNTED	1118.
COST PER VEHICLE-DISCOUNTED	67.

ASSET/MONOSC VERSION 3.3+ - MANNING ANALYSIS - 2/11/95 10.51.32.

NOTE-THIS INTERIM MANNING MODEL PROVIDES GROSS TREND ANALYSIS BASED ON HISTORICAL MANNING DATA OF EXISTING SHIPS. REQUESTS FOR SHIP MANNING DETERMINATION SHOULD BE DIRECTED TO NAVSEA.

PRINTED REPORT NO. 1 - SUMMARY

FULL LOAD WT, LTON 3980.1

TOTAL MMHRS REQ/WK	6817.8	NO WATCH STATIONS	5.
TOTAL MMHRS AVAIL/WK	5920.0	NO WATCHSTANDERS	14.
DEFERRED MMHRS/WK	897.8	NO NON-WATCHSTANDERS	74.

	OFFICERS	CPO	ENLISTED	TOTAL
REQ MANNING	11.	11.	104.	126.
AVAIL MANNING	15.	13.	82.	110.
DIFFERENCE	4.	2.	-22.	-16.
ACCOMMODATIONS	17.	15.	90.	122.

PRINTED REPORT NO. 2 - MANNING AND ACCOMMODATION SUMMARY

CREW ACCOM MARGIN FAC 0.10

	SHIPS CREW	AIR DETACH	FLAG STAFF /OTHER	ACCOMMODATION
OFFICERS	11.	4.	0.	17.
CPO	12.	1.	0.	15.
OEM	76.	6.	0.	90.
TOTAL	99.	11.	0.	122.

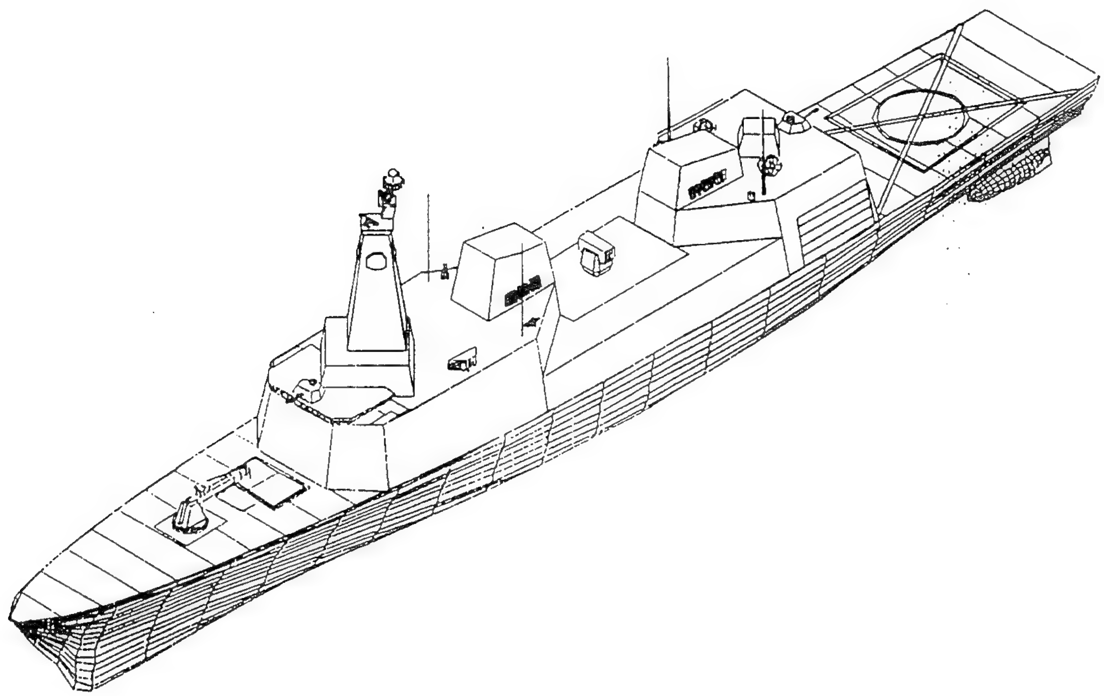
PRINTED REPORT NO. 3 - DEPARTMENTAL MANNING ANALYSIS

DEPARTMENT	MANNING FACTOR	OFFICERS	CPO	ENLISTED	TOTAL
CO/EXEC/NAV/MED	0.7	1.	2.	10.	13.
OPERATIONS	0.5	1.	2.	25.	28.
COMBAT	0.5	2.	3.	20.	25.
ENGINEERING	0.8	2.	2.	28.	32.
SUPPLY	0.5	1.	1.	15.	17.
AVIATION	1.0	4.	1.	6.	11.
FLAG STAFF/OTHER	---	0.	0.	0.	0.
REQ MANNING		11.	11.	104.	126.
AVAIL MANNING		15.	13.	82.	110.
DIFFERENCE		4.	2.	-22.	-16.

PRINTED REPORT NO. 4 - WEEKLY FUNCTIONAL WORKLOAD ANALYSIS

FUNCTION	WORKLOAD FACTOR	WEEKLY MHRS REQ	WEEKLY MHRS AVAIL	PERCENT
OPERATIONAL MANNING (OM)	0.5	2251.4		33.0
PLANNED MAINTENANCE (PM) + CORRECTIVE MAINTENANCE (CM)	0.5	700.9		10.3
OWN UNIT SUPPORT (OUS)	0.5	1368.9		20.1
FACILITY MAINTENANCE (FM)	0.5	488.7		7.2
PRODUCTIVITY ALLOWANCE (PA)	1.0	511.7		7.5
SERVICE DIVERSION ALLOWANCE (SDA) + TRAINING (T)	1.5	1496.2		21.9
TOTAL MMHRS REQ/WK		6817.8		100.0
WATCHSTANDERS (74HRS/MAN-WK)			1036.0	
NON-WATCHSTANDERS (66HRS/MAN-WK)			4884.0	
TOTAL MMHRS AVAIL/WK			5920.0	86.8
DEFERRED MMHRS/WK			897.8	13.2

COAST GUARD VERSION
ASSET PRINTED REPORT



PRINTED REPORT NO. 1 - HULL GEOMETRY SUMMARY

HULL OFFSETS IND-GIVEN		MIN BEAM, FT	36.00
HULL DIM IND-GEOSIM		MAX BEAM, FT	51.00
MARGIN LINE IND-CALC		HULL FLARE ANGLE, DEG	
HULL STA IND-OPTIMUM		FORWARD BULWARK, FT	0.00
HULL BC IND-CONV DD			

HULL PRINCIPAL DIMENSIONS (ON DWL)

LBP, FT	380.00	PRISMATIC COEF	0.570
LOA, FT	398.29	MAX SECTION COEF	0.795
BEAM, FT	51.00	WATERPLANE COEF	0.734
BEAM @ WEATHER DECK, FT	54.54	LCB/LCP	0.515
DRAFT, FT	15.58	HALF SIDING WIDTH, FT	1.00
DEPTH STA 0, FT	37.56	BOT RAKE, FT	0.00
DEPTH STA 3, FT	34.42	RAISED DECK HT, FT	0.00
DEPTH STA 10, FT	30.00	RAISED DECK FWD LIM, STA	
DEPTH STA 20, FT	30.76	RAISED DECK AFT LIM, STA	
FREEBOARD @ STA 3, FT	18.84	BARE HULL DISPL, LTON	3911.60
STABILITY BEAM, FT	49.70	AREA BEAM, FT	50.13

BARE HULL DATA ON LWL		STABILITY DATA ON LWL	
LGTH ON WL, FT	379.79	KB, FT	9.31
BEAM, FT	50.94	BMT, FT	16.87
DRAFT, FT	15.12	KG, FT	19.52
FREEBOARD @ STA 3, FT	19.30	FREE SURF COR, FT	0.10
PRISMATIC COEF	0.564	SERV LIFE KG ALW, FT	0.50
MAX SECTION COEF	0.790		
WATERPLANE COEF	0.729	GMT, FT	6.06
WATERPLANE AREA, FT2	14110.88	GML, FT	846.80
WETTED SURFACE, FT2	18716.17	GMT/B AVAIL	0.119
		GMT/B REQ	0.100
BARE HULL DISPL, LTON	3726.75		
APPENDAGE DISPL, LTON	86.61		
FULL LOAD WT, LTON	3813.36		

PRINTED REPORT NO. 2 - HULL OFFSETS

STATION NO. 1, AT X = -18.292 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.000	38.500
2	0.328	38.558
3	0.761	38.616
4	1.203	38.674
5	1.424	38.732

STATION NO. 2, AT X = -9.146 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.000	26.746
2	1.197	29.594
3	3.303	32.442
4	5.770	35.290
5	7.923	38.138

STATION NO. 3, AT X = 0.000 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.128	15.581
2	1.447	21.076
3	3.875	26.572
4	7.000	32.068
5	10.410	37.564

STATION NO. 4, AT X = 6.537 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.000	4.563
2	0.005	4.574
3	0.050	4.652
4	0.173	4.861
5	0.381	5.269
6	0.633	5.941
7	0.845	6.943
8	0.938	8.342
9	0.902	10.204
10	0.862	12.595
11	1.121	15.581
12	2.646	20.977
13	5.176	26.373
14	8.387	31.769
15	11.953	37.166

STATION NO. 5, AT X = 13.074 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.000	0.000
2	0.018	0.016
3	0.100	0.125
4	0.245	0.421
5	0.447	0.997
6	0.675	1.948
7	0.884	3.365
8	1.044	5.344
9	1.187	7.977
10	1.454	11.358
11	2.133	15.581
12	3.833	20.880
13	6.448	26.179
14	9.724	31.478
15	13.407	36.777

STATION NO. 6, AT X = 32.191 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	0.753	0.000
2	0.779	0.016
3	0.890	0.125
4	1.075	0.421
5	1.332	0.997
6	1.660	1.948
7	2.059	3.365
8	2.541	5.344
9	3.152	7.977
10	3.993	11.358
11	5.236	15.581
12	7.279	20.610
13	10.039	25.639
14	13.381	30.668
15	17.170	35.697

STATION NO. 7, AT X = 51.309 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.039	0.016
3	1.215	0.125
4	1.534	0.421
5	2.012	0.997
6	2.659	1.948
7	3.472	3.365
8	4.442	5.344
9	5.576	7.977
10	6.912	11.358
11	8.526	15.581
12	10.689	20.361
13	13.438	25.141
14	16.661	29.921
15	20.246	34.701

STATION NO. 8, AT X = 70.427 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.059	0.016
3	1.338	0.125
4	1.874	0.421
5	2.704	0.997
6	3.827	1.948
7	5.198	3.365
8	6.740	5.344
9	8.381	7.977
10	10.089	11.358
11	11.879	15.581
12	13.977	20.133
13	16.572	24.685
14	19.523	29.237
15	22.691	33.790

STATION NO. 9, AT X = 89.544 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.090	0.016
3	1.514	0.125
4	2.332	0.421
5	3.590	0.997
6	5.263	1.948
7	7.235	3.365
8	9.333	5.344
9	11.396	7.977
10	13.327	11.358
11	15.122	15.581
12	17.019	19.926
13	19.344	24.271
14	21.917	28.617
15	24.563	32.962

STATION NO. 10, AT X = 108.662 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.136	0.016
3	1.761	0.125
4	2.929	0.421
5	4.673	0.997
6	6.927	1.948
7	9.487	3.365
8	12.072	5.344
9	14.430	7.977
10	16.425	11.358
11	18.083	15.581
12	19.699	19.740

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   13          21.676          23.900
   14          23.815          28.060
   15          25.916          32.219
 STATION NO. 11, AT X = 127.779 FT
   POINT    HALF BEAM,FT    WATERLINE,FT
    1           1.000           0.000
    2           1.199           0.016
    3           2.078           0.125
    4           3.644           0.421
    5           5.894           0.997
    6           8.703           1.948
    7          11.778           3.365
    8          14.740           5.344
    9          17.260           7.977
   10          19.190          11.358
   11          20.624          15.581
   12          21.929          19.576
   13          23.525          23.570
   14          25.217          27.565
   15          26.808          31.560
 STATION NO. 12, AT X = 146.897 FT
   POINT    HALF BEAM,FT    WATERLINE,FT
    1           1.000           0.000
    2           1.265           0.016
    3           2.402           0.125
    4           4.355           0.421
    5           7.070           0.997
    6          10.365           1.948
    7          13.864           3.365
    8          17.099           5.344
    9          19.684           7.977
   10          21.475          11.358
   11          22.655          15.581
   12          23.660          19.432
   13          24.880          23.283
   14          26.148          27.135
   15          27.294          30.986
 STATION NO. 13, AT X = 166.015 FT
   POINT    HALF BEAM,FT    WATERLINE,FT
    1           1.000           0.000
    2           1.305           0.016
    3           2.610           0.125
    4           4.838           0.421
    5           7.913           0.997
    6          11.606           1.948
    7          15.461           3.365
    8          18.922           5.344
    9          21.544           7.977
   10          23.191          11.358
   11          24.142          15.581
   12          24.886          19.309
   13          25.760          23.038
   14          26.646          26.767
   15          27.430          30.496
 STATION NO. 14, AT X = 185.132 FT
   POINT    HALF BEAM,FT    WATERLINE,FT
    1           1.000           0.000
    2           1.311           0.016
    3           2.660           0.125
    4           4.999           0.421
    5           8.267           0.997
    6          12.210           1.948
    7          16.321           3.365
    8          19.973           5.344
    9          22.671           7.977
```

10	24.269	11.358
11	25.097	15.581
12	25.664	19.208
13	26.280	22.835
14	26.888	26.463
15	27.430	30.090

STATION NO. 15, AT X = 204.250 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.000
2	1.310	0.016
3	2.650	0.125
4	4.970	0.421
5	8.210	0.997
6	12.137	1.948
7	16.273	3.365
8	20.018	5.344
9	22.875	7.977
10	24.653	11.358
11	25.569	15.581
12	26.062	19.127
13	26.534	22.674
14	26.989	26.221
15	27.430	29.768

STATION NO. 16, AT X = 226.219 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	0.259
2	1.260	0.275
3	2.422	0.382
4	4.522	0.673
5	7.563	1.240
6	11.359	2.174
7	15.476	3.569
8	19.339	5.514
9	22.439	8.104
10	24.507	11.428
11	25.604	15.581
12	26.112	19.061
13	26.569	22.542
14	27.000	26.022
15	27.430	29.503

STATION NO. 17, AT X = 248.188 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	1.090
2	1.161	1.104
3	1.993	1.206
4	3.751	1.481
5	6.562	2.017
6	10.285	2.901
7	14.469	4.220
8	18.488	6.060
9	21.767	8.509
10	23.992	11.654
11	25.196	15.581
12	25.812	19.023
13	26.398	22.464
14	26.942	25.906
15	27.430	29.348

STATION NO. 18, AT X = 270.156 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	2.520
2	1.102	2.533
3	1.723	2.624
4	3.221	2.872
5	5.788	3.356
6	9.321	4.152

7	13.397	5.341
8	17.403	7.000
9	20.756	9.207
10	23.109	12.041
11	24.423	15.581
12	25.217	19.012
13	26.037	22.443
14	26.791	25.874
15	27.390	29.306

STATION NO. 19, AT X = 292.125 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	4.492
2	1.069	4.503
3	1.559	4.580
4	2.852	4.791
5	5.162	5.201
6	8.424	5.878
7	12.270	6.887
8	16.141	8.295
9	19.484	10.169
10	21.923	12.575
11	23.318	15.581
12	24.303	19.029
13	25.335	22.477
14	26.273	25.925
15	26.978	29.374

STATION NO. 20, AT X = 314.094 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	6.865
2	1.050	6.874
3	1.446	6.935
4	2.557	7.100
5	4.596	7.423
6	7.533	7.955
7	11.069	8.748
8	14.723	9.854
9	17.987	11.327
10	20.458	13.219
11	21.874	15.581
12	23.057	19.074
13	24.275	22.567
14	25.366	26.060
15	26.170	29.553

STATION NO. 21, AT X = 336.063 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	9.442
2	1.037	9.449
3	1.358	9.492
4	2.293	9.608
5	4.044	9.835
6	6.614	10.210
7	9.780	10.768
8	13.149	11.548
9	16.268	12.585
10	18.707	13.917
11	20.069	15.581
12	21.470	19.146
13	22.874	22.712
14	24.115	26.278
15	25.025	29.844

STATION NO. 22, AT X = 358.031 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	12.012
2	1.028	12.016
3	1.285	12.041

4	2.046	12.108
5	3.497	12.241
6	5.668	12.458
7	8.416	12.783
8	11.445	13.236
9	14.358	13.839
10	16.699	14.613
11	17.931	15.581
12	19.575	19.247
13	21.177	22.914
14	22.574	26.580
15	23.602	30.247

STATION NO. 23, AT X = 380.000 FT

POINT	HALF BEAM,FT	WATERLINE,FT
1	1.000	14.387
2	1.024	14.388
3	1.231	14.396
4	1.834	14.419
5	2.988	14.463
6	4.753	14.536
7	7.066	14.645
8	9.727	14.796
9	12.401	14.998
10	14.600	15.257
11	15.646	15.581
12	17.535	19.375
13	19.303	23.170
14	20.821	26.965
15	21.961	30.760

PRINTED REPORT NO. 3 - HULL BOUNDARY CONDITIONS

HULL OFFSETS IND-GIVEN

PRINTED REPORT NO. 4 - MARGIN LINE

MARGIN LINE IND-CALC
MIN FREEBOARD MARGIN, FT 0.25

DIST FROM FP FT	HT ABOVE BL FT
-18.29	38.48
-9.15	37.89
0.00	37.31
6.54	36.92
13.07	36.53
32.19	35.45
51.31	34.45
70.43	33.54
89.54	32.71
108.66	31.97
127.78	31.31
146.90	30.74
166.01	30.25
185.13	29.84
204.25	29.52
226.22	29.25
248.19	29.10
270.16	29.06
292.13	29.12
314.09	29.30
336.06	29.59
358.03	30.00
380.00	30.51

PRINTED REPORT NO. 5 - HULL SECTIONAL AREA CURVE

STATION	LOCATION,FT	AREA,FT2
1	-18.29	0.00
2	-9.15	0.00
3	0.00	0.00
4	6.54	18.36
5	13.07	37.27
6	32.19	97.35
7	51.31	165.96
8	70.43	242.37
9	89.54	323.58
10	108.66	405.02
11	127.78	481.29
12	146.90	546.74
13	166.01	596.17
14	185.13	625.33
15	204.25	631.35
16	226.22	608.36
17	248.19	554.94
18	270.16	475.99
19	292.13	379.48
20	314.09	275.69
21	336.06	175.87
22	358.03	90.37
23	380.00	26.16

C,E>RUN,HULL SUB
COMMAND STRING IS:
RUN,HULL SUBDIV MODULE

ASSET/MONOSC VERSION 3.3+ - HULL SUBDIV MODULE - 2/11/95 10.57.05.

PRINTED REPORT NO. 1 - SUMMARY

HULL SUBDIV IND-CALC
SHAFT SUPPORT TYPE IND-POD

INNER BOT IND-PRESENT

LBP, FT	380.00	HULL AVG DECK HT, FT	10.57
DEPTH STA 10, FT	30.00		
		NO INTERNAL DECKS	2
HULL VOLUME, FT3	387374.	NO TRANS BHDS	13
MR VOLUME, FT3	48700.	NO LONG BHDS	0
TANKAGE VOL REQ, FT3	28195.	NO MACHY RMS	2
EXCESS TANKAGE, FT3	1775.	NO PROP SHAFTS	2

ARR AREA LOST TANKS, FT2	32.2
HULL ARR AREA AVAIL, FT2	29531.5

PRINTED REPORT NO. 2 - TRANSVERSE BULKHEADS

HULL SUBDIV IND-CALC

NO TRANS BHDS	13
TRANS BHD SPACING(/LBP)	0.077

BULKHEAD NO	DISTANCE FROM FP,FT	DISTANCE FROM FP/LBP	MR FWD BHD LOC
1	19.00	0.050	
2	42.76	0.113	
3	66.53	0.175	
4	90.29	0.238	
5	114.06	0.300	
6	137.82	0.363	MMR
7	172.65	0.454	
8	201.91	0.531	

9	231.17	0.608	MMR
10	266.00	0.700	
11	294.50	0.775	
12	323.00	0.850	
13	351.50	0.925	

PRINTED REPORT NO. 3 - LONGITUDINAL BULKHEADS

NO LONG BHDS 0

PRINTED REPORT NO. 4 - INTERNAL DECKS AND INNER BOTTOM

HULL SUBDIV IND-CALC

NO INTERNAL DECKS	2
DEPTH STA 10, FT	30.00
HULL AVG DECK HT, FT	10.57
RAISED DECK HT, FT	0.00

INT DECK NO	DIST FROM BL AT .5 LBP,FT	DECK SHEER FRAC
1	20.00	1.0
2	12.25	0.0
IB	4.50	

INNER BOT IND-PRESENT

--------- INNER BOTTOM ----------

CVK HT, FT	4.50
HORZ OFFSET HT, FT	
HORZ OFFSET, FT	
FLAT FWD LOC, FT	19.00
FLAT AFT LOC, FT	292.20
OFFSET FWD LOC, FT	
OFFSET AFT LOC, FT	

INT DECK NO	AVL ARR AREA FT2	AVL ARR VOL FT3	USABLE TANKAGE FT3	VOIDS FT3	ARR AREA LOST TO TANKS,FT2
1	15889.8	174243.	0.	0.	0.0
2	9391.9	92645.	602.	307.	0.0
IB	4249.8	45361.	245.	0.	32.2
HOLD			29123.	56.	
TOTAL	29531.5	312250.	29970.	363.	32.2

PRINTED REPORT NO. 5 - LARGE OBJECT SPACES

SHAFT SUPPORT TYPE IND-POD

FOREPEAK VOID VOL, FT3	363.
FOREPEAK TANKAGE, FT3	727.
CHAIN LOCKER VOL, FT3	1090.
SEWAGE VOL REQ, FT3	245.
SHAFT ALLEY VOL, FT3	0.
ADDED STEER GEAR VOL, FT3	4981.
MR AFT BHD POS, FT	266.00
INNER BOT VOL, FT3	17460.

MR NO	TYPE	FWD BHD ID	UPR DECK ID	LGTH AVL FT	LGTH RQD FT	HT AVL FT	HT RQD FT	MR VOL FT3	INNER BOT VOL FT3
1	MMR	6	1	34.83	34.83	20.00	19.58	24964.	3452.
2	MMR	9	1	34.83	34.83	20.00	19.58	23737.	2159.
							TOTAL	48700.	5611.

PRINTED REPORT NO. 6 - HULL COMPARTMENT ARRANGEABLE AREA

NUMBER OF INTERNAL DECKS - 2
NUMBER OF TRANSVERSE BULKHEADS - 13
INNER BOTTOM INDICATOR - PRESENT

AREAS FOR EACH HULL COMPARTMENT:

DECK HT, FT ABL	20.0	12.3	4.5
COMP 1, FT2	283.0		
COMP 2, FT2	467.9	193.2	107.2
COMP 3, FT2	649.4	372.1	209.3
COMP 4, FT2	813.4	563.7	337.1
COMP 5, FT2	955.0	752.0	484.2
COMP 6, FT2	1069.3	917.6	633.8
COMP 7, FT2	1711.2	MMR	MMR
COMP 8, FT2	1511.7	1437.7	1084.9
COMP 9, FT2	1532.0	1458.7	1055.4
COMP 10, FT2	1799.6	MMR	MMR
COMP 11, FT2	1419.1	1284.9	370.1
COMP 12, FT2	1340.4	1136.5	
COMP 13, FT2	1233.2	833.2	
COMP 14, FT2	1104.6	442.3	

C,E>RUN,DECKHOUS
COMMAND STRING IS:
RUN,DECKHOUSE MODULE

ASSET/MONOSC VERSION 3.3+ - DECKHOUSE MODULE - 2/11/95 10.58.49.

PRINTED REPORT NO. 1 - DECKHOUSE SUMMARY

DKHS GEOM IND-GENERATE		BLAST RESIST IND-7 PSI	
DKHS SIZE IND-AUTO X		FIRE PROTECT IND-NONE	
DKHS MTRL TYPE IND-HTS			
LBP, FT	380.00	DKHS LENGTH OA, FT	188.81
BEAM, FT	51.00	DKHS MAX WIDTH, FT	54.91
AREA BEAM, FT	50.13	DKHS HT (W/O PLTHS), FT	42.55
DKHS FWD LIMIT-	STA 4.0	OTHER ARR AREA REQ, FT2	34896.52
DKHS AFT LIMIT-	STA 13.9	HULL ARR AREA AVAIL, FT2	29531.47
DKHS AVG DECK HT, FT	9.84	DKHS ARR AREA REQ, FT2	4849.69
DKHS NO LVLS	2	HANGER ARR AREA REQ, FT2	0.00
DKHS AVG SIDE CLR, FT	.00	PLTHS ARR AREA REQ, FT2	608.00
DKHS AVG SIDE ANG, DEG	10.00		
DKHS NO PRISMS	20	DKHS MAX ARR AREA, FT2	10908.19
DKHS ARR AREA DERIV, FT2	220.13	DKHS ARR AREA AVAIL, FT2	10307.76
DKHS MIN ALW BEAM, FT	20.73	DKHS VOLUME, FT3	104558.43
BRIDGE L-O-S OVER BOW, FT	247.57		
		DKHS WEIGHT, LTON	200.97
DKHS SIDE CLR OFFSET, FT		DKHS VCG, FT	36.41
DKHS SIDE ANG OFFSET, DEG			
DKHS DECK HT OFFSET, FT			

PRINTED REPORT NO. 2 - SUPERSTRUCTURE DECKHOUSES

NO OF SS DECKHOUSE BLKS	20
DKHS VOLUME, FT3	104558.
DKHS ARR AREA AVAIL, FT2	10307.8

	DECKHOUSE NUMBER 1	2	3	4	5
DIST FROM BOW, FT	76.00	85.94	95.88	105.81	115.75
LENGTH, FT	9.94	9.94	9.94	9.94	9.94
DIST FROM CL, FT					
FWD/PORT/BTM	-23.30	-24.25	-25.06	-25.74	-26.30
AFT/PORT/BTM	-24.25	-25.06	-25.74	-26.30	-26.73
FWD/STBD/BTM	23.30	24.25	25.06	25.74	26.30
AFT/STBD/BTM	24.25	25.06	25.74	26.30	26.73
FWD/PORT/TOP	-21.56	-22.52	-23.33	-24.01	-24.57
AFT/PORT/TOP	-22.52	-23.33	-24.01	-24.57	-25.00
FWD/STBD/TOP	21.56	22.52	23.33	24.01	24.57
AFT/STBD/TOP	22.52	23.33	24.01	24.57	25.00
DIST ABV BASELINE FWD, FT	33.54	33.11	32.71	32.32	31.97
DIST ABV BASELINE AFT, FT	33.11	32.71	32.32	31.97	31.63
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	4579.	4750.	4893.	5011.	5104.
ARR AREA, FT2	446.4	463.6	478.1	490.1	499.8

	DECKHOUSE NUMBER 6	7	8	9	10
DIST FROM BOW, FT	125.69	135.63	145.56	155.50	165.44
LENGTH, FT	9.94	9.94	9.94	9.94	9.94
DIST FROM CL, FT					
FWD/PORT/BTM	-26.73	-27.05	-27.27	-27.40	-27.43
AFT/PORT/BTM	-27.05	-27.27	-27.40	-27.43	-27.43
FWD/STBD/BTM	26.73	27.05	27.27	27.40	27.43
AFT/STBD/BTM	27.05	27.27	27.40	27.43	27.43
FWD/PORT/TOP	-25.00	-25.31	-25.54	-25.66	-25.70
AFT/PORT/TOP	-25.31	-25.54	-25.66	-25.70	-25.69
FWD/STBD/TOP	25.00	25.31	25.54	25.66	25.70
AFT/STBD/TOP	25.31	25.54	25.66	25.70	25.69
DIST ABV BASELINE FWD, FT	31.63	31.31	31.02	30.75	30.51
DIST ABV BASELINE AFT, FT	31.31	31.02	30.75	30.51	30.29
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	5172.	5220.	5248.	5258.	5255.
ARR AREA, FT2	507.1	512.3	515.7	517.3	517.6

	DECKHOUSE NUMBER 11	12	13	14	15
DIST FROM BOW, FT	175.38	185.31	195.25	205.19	215.13
LENGTH, FT	9.94	9.94	9.94	9.94	9.94
DIST FROM CL, FT					
FWD/PORT/BTM	-27.43	-27.43	-27.43	-27.43	-27.43
AFT/PORT/BTM	-27.43	-27.43	-27.43	-27.43	-27.43
FWD/STBD/BTM	27.43	27.43	27.43	27.43	27.43
AFT/STBD/BTM	27.43	27.43	27.43	27.43	27.43
FWD/PORT/TOP	-25.69	-25.69	-25.69	-25.69	-25.69
AFT/PORT/TOP	-25.69	-25.69	-25.69	-25.69	-25.69
FWD/STBD/TOP	25.69	25.69	25.69	25.69	25.69
AFT/STBD/TOP	25.69	25.69	25.69	25.69	25.69
DIST ABV BASELINE FWD, FT	30.29	30.09	29.91	29.75	29.62
DIST ABV BASELINE AFT, FT	30.09	29.91	29.75	29.62	29.51
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	5249.	5243.	5237.	5231.	5225.
ARR AREA, FT2	517.6	517.6	517.6	517.6	517.6

	DECKHOUSE NUMBER 16	17	18	19	20
DIST FROM BOW, FT	225.06	235.00	244.94	254.88	76.00
LENGTH, FT	9.94	9.94	9.94	9.94	22.65
DIST FROM CL, FT					
FWD/PORT/BTM	-27.43	-27.43	-27.43	-27.46	-15.56
AFT/PORT/BTM	-27.43	-27.43	-27.46	-27.43	-17.74
FWD/STBD/BTM	27.43	27.43	27.43	27.46	15.56

AFT/STBD/BTM	27.43	27.43	27.46	27.43	17.74
FWD/PORT/TOP	-25.69	-25.69	-25.69	-25.72	-13.83
AFT/PORT/TOP	-25.69	-25.69	-25.72	-25.70	-16.01
FWD/STBD/TOP	25.69	25.69	25.69	25.72	13.83
AFT/STBD/TOP	25.69	25.69	25.72	25.70	16.01
DIST ABV BASELINE FWD, FT	29.51	29.43	29.36	29.32	42.55
DIST ABV BASELINE AFT, FT	29.43	29.36	29.32	29.31	42.55
HEIGHT, FT	9.84	9.84	9.84	9.84	9.84
VOLUME, FT3	5219.	5213.	5210.	5204.	7038.
ARR AREA, FT2	517.6	517.6	517.8	517.9	701.0

PRINTED REPORT NO. 3 - DECKHOUSE STRUCTURE WEIGHT SUMMARY

DKHS MTRL TYPE IND-HTS
FIRE PROTECT IND-NONE
BLAST RESIST IND-7 PSI

DKHS STRUCT DENSITY, LBM/FT3 4.18
HANGER VOL, FT3 0.

	WT-LTON	VCG-FT	LCG-FT
CALCULATED SWBS150	201.0	36.41	166.15

DECK HOUSE	VOLUME FT3	VCG FROM BL FT
NO. 1	4579.	38.29
NO. 2	4750.	37.87
NO. 3	4893.	37.47
NO. 4	5011.	37.10
NO. 5	5104.	36.75
NO. 6	5172.	36.42
NO. 7	5220.	36.11
NO. 8	5248.	35.82
NO. 9	5258.	35.56
NO.10	5255.	35.32
NO.11	5249.	35.10
NO.12	5243.	34.91
NO.13	5237.	34.74
NO.14	5231.	34.59
NO.15	5225.	34.46
NO.16	5219.	34.36
NO.17	5213.	34.28
NO.18	5210.	34.22
NO.19	5204.	34.19
NO.20	7038.	47.38
	104558.	36.41

C,E>RUN,HULL STRUC
COMMAND STRING IS:
RUN,HULL STRUCT MODULE

ASSET/MONOSC VERSION 3.3+ - HULL STRUCT MODULE - 2/11/95 10.59.21.

PRINTED REPORT NO. 1 - SUMMARY

INNER BOT IND-PRESENT
STIFFENER SHAPE IND-CALC

HULL LOADS IND-CALC

---------------------- HULL STRENGTH AND STRESS ----------------------

HOGGING BM, FT-LTON	65606.	PRIM STRESS KEEL-HOG, KSI	15.46
SAGGING BM, FT-LTON	54696.	PRIM STRESS KEEL-SAG, KSI	12.89
MIDSHIP MOI, FT2-IN2	139566.	PRIM STRESS DECK-HOG, KSI	16.14
DIST N.A. TO KEEL, FT	14.68	PRIM STRESS DECK-SAG, KSI	13.46
DIST N.A. TO DECK, FT	15.33	HULL MARGIN STRESS, KSI	2.24
SEC MOD TO KEEL, FT-IN2	9508.	SEC MOD TO DECK, FT-IN2	9105.

HULL STRUCTURE COMPONENTS

	MATERIAL TYPE	NO OF SEGMENT	NO
WET. DECK	HTS	4	1
SIDE SHELL	HTS	4	1
BOTTOM SHELL	HTS	6	1
INNER BOTTOM	HTS	5	1
INT. DECK	HTS	4	2
STRINGER, SHEER	HTS	1	1
LONG BULKHEAD			0
TRANS BULKHEAD	HTS		13

HULL STRUCTURE WEIGHT

SWBS	COMPONENT	WEIGHT, LTON	VCG, FT
100	HULL STRUCTURE	759.4	18.71
110	SHELL+SUPPORT	362.1	13.95
120	HULL STRUCTURAL BHD	78.0	18.79
130	HULL DECKS	260.9	26.76
140	HULL PLATFORM/FLATS	58.5	12.22

PRINTED REPORT NO. 2 - HULL STRUCTURES WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
100	HULL STRUCTURES	759.4	18.71
110	SHELL + SUPPORTS	362.1	13.95
111	PLATING	218.4	18.76
113	INNER BOTTOM	36.4	4.50
115	STANCHIONS	5.1	15.00
116	LONG FRAMING	64.2	1.49
117	TRANS FRAMING	38.0	16.26
120	HULL STRUCTURAL BULKHDS	78.0	18.79
121	LONG BULKHDS		
122	TRANS BULKHDS	66.6	18.79
123	TRUNKS + ENCLOSURES	11.3	18.79
130	HULL DECKS	260.9	26.76
131	MAIN DECK	153.3	31.05
132	2ND DECK	107.6	20.66
133	3RD DECK		
134	4TH DECK		
135	5TH DECK+DECKS BELOW		
136	01 HULL DECK		
140	HULL PLATFORMS/FLATS	58.5	12.22
141	1ST PLATFORM	58.5	12.22
142	2ND PLATFORM		
143	3RD PLATFORM		
144	4TH PLATFORM		
145	5TH PLAT+PLATS BELOW		

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 3 - WEATHER DECK

DECK MTRL TYPE-HTS
STRINGER PLATE MTRL TYPE-HTS

	SHELL	STRINGER PLATE
MODULUS OF ELASTICITY, KSI	29600.0	29600.0
DENSITY, LBM/FT3	489.02	489.02
YIELD STRENGTH, KSI	45.00	45.00
MAX PRIMARY STRENGTH, KSI	21.28	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00
STRINGER PLATE WIDTH, FT	6.00	

SEGMENT GEOMETRY

	--------NODE COORD, FT				---SCND. LOAD, FT--	
SEG	YIB	ZIB	YOB	ZOB	HEAD1	HEAD2
1	0.00	30.01	6.86	30.01	8.25	
2	6.86	30.01	13.72	30.01	8.25	
3	13.72	30.01	20.57	30.01	8.25	
4	20.57	30.01	27.43	30.01	8.25	

SEGMENT SCANTLINGS

	----------------SCANTLINGS OF STIFFENED PLATES----------------							
	STIFFENERS				CATLG	NO.OF	PLATE	SPACING
SEG	---------INXINXIN/IN--------------				NO	STIFF	TK, IN	IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.57
2 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.57
3 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.57
4 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.3438	20.57

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

	----------------PROPERTIES OF STIFFENED PLATES----------------						
	-------AREA------		N.A. TO	-----SEC MOD-----			SMEAR
	TOTAL	SHEAR	PLATE	PLATE	FLANGE	WT/FT	RATIO
SEG	IN2	IN2	IN	IN3	IN3	LBF/FT	
1	8.51	0.73	0.71	19.92	3.91	28.91	0.20
2	8.51	0.73	0.71	19.92	3.91	28.91	0.20
3	8.51	0.73	0.71	19.92	3.91	28.91	0.20
4	8.51	0.73	0.71	19.92	3.91	28.91	0.20

PRINTED REPORT NO. 4 - SIDE SHELL

SIDE SHELL MTRL TYPE-HTS
SHEER STRAKE MTRL TYPE-HTS

	SHELL	SHEER STRAKE
MODULUS OF ELASTICITY, KSI	29600.0	29600.0
DENSITY, LBM/FT3	489.02	489.02
YIELD STRENGTH, KSI	45.00	45.00
MAX PRIMARY STRENGTH, KSI	21.28	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00
SHEER STRAKE WIDTH, FT	6.00	

SEGMENT GEOMETRY

	--------NODE COORD, FT				---SCND. LOAD, FT--	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
1	27.43	30.01	26.54	24.01	7.81	
2	26.54	24.01	25.90	20.00	12.00	
3	25.90	20.00	24.56	12.25	17.89	
4	24.56	12.25	20.77	6.00	25.20	

SEGMENT SCANTLINGS

	----------------SCANTLINGS OF STIFFENED PLATES----------------							
	STIFFENERS				CATLG	NO.OF	PLATE	SPACING
SEG	---------INXINXIN/IN--------------				NO	STIFF	TK, IN	IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	4	0.2500	18.20
2 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.24
3 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2813	23.60
4 *R	4.730X	3.960X	0.190/	0.210	2.	4	0.3125	22.36

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

	PROPERTIES OF STIFFENED PLATES						
	AREA		N.A. TO	SEC MOD			SMEAR
	TOTAL	SHEAR	PLATE	PLATE	FLANGE	WT/FT	RATIO
SEG	IN2	IN2	IN	IN3	IN3	LBF/FT	
1	5.99	0.71	0.87	14.53	3.80	20.34	0.32
2	5.50	0.71	0.94	13.18	3.79	18.68	0.35
3	8.08	0.72	0.70	19.59	3.86	27.43	0.22
4	8.72	1.00	0.89	26.22	5.36	29.60	0.25

PRINTED REPORT NO. 5 - BOTTOM SHELL

BOTTOM SHELL MTRL TYPE-HTS

MODULUS OF ELASTICITY, KSI	29600.0
DENSITY, LBM/FT3	489.02
YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

	NODE COORD, FT				SCND. LOAD, FT	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
1	20.77	6.00	18.57	4.50	28.83	
2	18.57	4.50	16.46	3.45	30.05	
3	16.46	3.45	12.34	2.00	31.34	
4	12.34	2.00	8.23	1.00	32.55	
5	8.23	1.00	4.11	0.31	33.39	
6	4.11	0.31	0.00	0.00	33.89	

SEGMENT SCANTLINGS

	SCANTLINGS OF STIFFENED PLATES							
	STIFFENERS				CATLG	NO.OF	PLATE	SPACING
SEG	INXINXIN/IN				NO	STIFF	TK, IN	IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	1	0.3438	16.04
2 *R	3.745X	3.940X	0.170/	0.205	1.	1	0.3438	14.00
3 *R	4.730X	3.960X	0.190/	0.210	2.	2	0.3438	17.46
4 *R	4.730X	3.960X	0.190/	0.210	2.	2	0.3438	16.99
5 *R	4.730X	3.960X	0.190/	0.210	2.	2	0.3438	16.52
6 *R	4.730X	3.960X	0.190/	0.210	2.	1	0.3438	19.13

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

	PROPERTIES OF STIFFENED PLATES						
	AREA		N.A. TO	SEC MOD			SMEAR
	TOTAL	SHEAR	PLATE	PLATE	FLANGE	WT/FT	RATIO
SEG	IN2	IN2	IN	IN3	IN3	LBF/FT	
1	6.96	0.73	0.82	16.37	3.89	23.62	0.26
2	6.25	0.73	0.90	14.66	3.87	21.24	0.30
3	7.73	1.00	1.00	22.85	5.37	26.26	0.29
4	7.57	1.00	1.02	22.35	5.36	25.71	0.30
5	7.41	1.00	1.04	21.83	5.36	25.16	0.30
6	8.31	1.00	0.95	24.64	5.38	28.22	0.26

PRINTED REPORT NO. 6 - INNER BOTTOM

INNER BOT IND-PRESENT

INNER BOTTOM MTRL TYPE-HTS

MODULUS OF ELASTICITY, KSI	29600.0
DENSITY, LBM/FT3	489.02

YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

	--------NODE COORD, FT			-------------------	SCND. LOAD, FT--	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
1	18.57	4.50	16.46	4.50	2.61	30.91
2	16.46	4.50	12.34	4.50	2.70	29.43
3	12.34	4.50	8.23	4.50	2.70	27.38
4	8.23	4.50	4.11	4.50	2.70	25.32
5	4.11	4.50	0.00	4.50	2.70	23.26

SEGMENT SCANTLINGS

	----------------SCANTLINGS OF STIFFENED PLATES----------------							
	STIFFENERS				CATLG	NO.OF	PLATE	SPACING
SEG	---------INXINXIN/IN--------------				NO	STIFF	TK, IN	IN
1 *R	3.745X	3.940X	0.170/	0.205	1.	1	0.2188	12.66
2 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46
3 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46
4 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46
5 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2500	16.46

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

	----------------PROPERTIES OF STIFFENED PLATES------------------						
	------AREA------		N.A. TO	-----SEC MOD-----			SMEAR
	TOTAL	SHEAR	PLATE	PLATE	FLANGE	WT/FT	RATIO
SEG	IN2	IN2	IN	IN3	IN3	LBF/FT	
1	4.21	0.71	1.17	9.56	3.71	14.30	0.52
2	5.55	0.71	0.93	13.33	3.79	18.86	0.35
3	5.55	0.71	0.93	13.33	3.79	18.86	0.35
4	5.55	0.71	0.93	13.33	3.79	18.86	0.35
5	5.55	0.71	0.93	13.33	3.79	18.86	0.35

PRINTED REPORT NO. 7 - INTERNAL DECKS

NUMBER OF INTERNAL DECKS 2

INTERNAL DECK MTRL TYPE-HTS

MODULUS OF ELASTICITY, KSI	29600.0
DENSITY, LBM/FT3	489.02
YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

	--------NODE COORD, FT			-------------------	SCND. LOAD, FT--	
SEG	YIB	ZIB	YOB	ZOB	HEAD1	HEAD2
DECK NO.1						
SEG						
1	0.00	20.00	6.86	20.00	2.67	17.21
2	6.86	20.00	13.72	20.00	2.67	20.64
3	13.72	20.00	20.57	20.00	2.67	25.07
4	20.57	20.00	25.90	20.00	2.72	20.46

DECK NO.2

SEG						
1	0.00	12.25	6.86	12.25	2.67	17.21
2	6.86	12.25	13.72	12.25	2.67	20.64
3	13.72	12.25	24.56	12.25	2.67	25.07

SEGMENT SCANTLINGS

SEG	----------------SCANTLINGS OF STIFFENED PLATES----------------							
	STIFFENERS ---------INXINXIN/IN--------------				CATLG NO	NO.OF STIFF	PLATE TK, IN	SPACING IN
DECK NO.1								
SEG								
1 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.57
2 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.57
3 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.57
4 *R	3.745X	3.940X	0.170/	0.205	1.	2	0.2813	21.30
DECK NO.2								
SEG								
1 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.57
2 *R	3.745X	3.940X	0.170/	0.205	1.	3	0.2188	20.57
3 *R	3.745X	3.940X	0.170/	0.205	1.	5	0.2188	21.69

NOTE: *R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

SEG	----------------PROPERTIES OF STIFFENED PLATES----------------						
	------AREA------ TOTAL IN2	SHEAR IN2	N.A. TO PLATE IN	-----SEC MOD----- PLATE IN3	FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
DECK NO.1							
SEG							
1	5.94	0.71	0.86	14.59	3.78	20.18	0.32
2	5.94	0.71	0.86	14.59	3.78	20.18	0.32
3	5.94	0.71	0.86	14.59	3.78	20.18	0.32
4	7.43	0.72	0.75	18.02	3.85	25.24	0.24
DECK NO.2							
SEG							
1	5.94	0.71	0.86	14.59	3.78	20.18	0.32
2	5.94	0.71	0.86	14.59	3.78	20.18	0.32
3	6.19	0.71	0.83	15.27	3.79	21.01	0.30

PRINTED REPORT NO. 8 - STRENGTH AND STRESS OF STIFFENED PLATE AT DESIGN LOAD

INNER BOT IND-PRESENT

SEG	-PRIMARY STRESS- TENSION KSI	COMP. KSI	-LOCAL STRESS- BEND. KSI	SHEAR KSI	--------STRENGTH-------- BUCKL. KSI	ULTIMATE KSI	COLUMN KSI
WET DECK							
1	16.11	13.43	6.61	2.21	29.89	33.06	33.54
2	16.11	13.43	6.61	2.21	29.89	33.06	33.54
3	16.11	13.43	6.61	2.21	29.89	33.06	33.54
4	16.11	13.43	6.61	2.21	29.89	33.06	33.54
SIDE SHELL							
1	14.54	12.28	5.69	1.90	20.20	28.69	36.11
2	11.96	10.38	7.84	2.60	25.37	31.21	36.70
3	8.90	8.14	16.67	5.59	15.21	25.70	33.81
4	9.81	10.47	16.01	5.38	20.91	29.07	38.30
BOT SHELL							
1	10.93	12.35	18.12	6.04	38.96	38.65	35.26
2	11.31	12.99	16.55	5.49	41.29	41.46	36.07
3	11.71	13.66	15.54	5.19	36.97	36.79	39.15
4	12.09	14.28	15.72	5.25	37.66	37.40	39.28
5	12.35	14.72	15.69	5.23	38.33	38.02	39.42
6	12.50	14.98	18.37	6.15	34.26	34.71	38.69

INNER BOT							
1	11.15	12.70	16.06	5.26	31.97	33.83	38.19
2	11.15	12.70	19.47	6.46	24.69	30.91	36.64
3	11.15	12.70	18.11	6.01	24.69	30.91	36.64
4	11.15	12.70	16.75	5.56	24.69	30.91	36.64
5	11.15	12.70	15.39	5.11	24.69	30.91	36.64
INT DECK NO. 1							
1	10.92	9.62	14.27	4.76	12.10	23.43	36.08
2	10.92	9.62	17.11	5.71	12.10	23.43	36.08
3	10.92	9.62	20.78	6.93	12.10	23.43	36.08
4	10.92	9.62	17.23	5.77	18.67	27.84	34.53
INT DECK NO. 2							
1	0.00	0.00	14.27	4.76	12.10	23.43	36.08
2	0.00	0.00	17.11	5.71	12.10	23.43	36.08
3	0.00	0.00	21.88	7.31	10.89	22.43	35.79

PRINTED REPORT NO. 9 - FACTOR OF SAFETY OF STIFFENED PLATE
AT DESIGN LOAD

INNER BOT IND-PRESENT

	--PLATE-	-STIFFENER-	--------STIFFENED PLATE-----------		
SEG	BUCKLING	SHEAR	COMP+BEND	ULTIMATE	TENSION+BEND.
WET DECK					
1	2.12	10.30	1.30	1.40	1.67
2	2.12	10.30	1.30	1.40	1.67
3	2.12	10.30	1.30	1.40	1.67
4	2.12	10.30	1.30	1.40	1.67
SIDE SHELL					
1	1.55	12.03	1.52	1.41	1.88
2	2.20	8.77	1.59	1.76	1.92
3	1.55	4.08	1.25	1.57	1.49
4	1.72	4.24	1.31	1.63	1.47
BOT SHELL					
1	2.68	3.78	1.00	1.66	1.31
2	2.71	4.15	1.03	1.75	1.36
3	2.38	4.39	1.18	1.65	1.39
4	2.32	4.35	1.15	1.61	1.37
5	2.30	4.36	1.14	1.60	1.36
6	2.01	3.70	1.03	1.40	1.23
INNER BOT					
1	9.98	4.34	2.37	7.17	2.37
2	8.68	3.53	1.95	7.08	1.95
3	9.34	3.79	2.10	7.61	2.10
4	10.09	4.10	2.27	8.23	2.27
5	10.99	4.46	2.47	8.96	2.47
INT DECK NO. 1					
1	6.37	4.79	2.66	7.91	2.66
2	5.31	3.99	2.22	6.60	2.22
3	4.38	3.29	1.83	5.43	1.83
4	9.86	3.95	2.20	9.03	2.20
INT DECK NO. 2					
1	6.37	4.79	2.66	7.91	2.66
2	5.31	3.99	2.22	6.60	2.22
3	3.91	3.12	1.74	5.12	1.74

PRINTED REPORT NO. 10 - GIRDER PROPERTIES, STRENGTH ,STRESSES
AND FACTOR OF SAFETY

DECK MTRL TYPE-HTS
BOT MTRL TYPE-HTS

HULL LOADS IND-CALC
GIRDER/STIFF.,POSITION

	COORDINATE, FT YLOC	COORDINATE, FT ZLOC	SCND. LOAD, FT HEAD1	SCND. LOAD, FT HEAD2
WET DECK				
GIRDER				
1	0.00	30.01	8.40	
2	6.86	30.01	8.40	
3	13.72	30.01	8.40	
4	20.57	30.01	8.40	
INT DECK 1.				
GIRDER				
1	0.00	20.00	2.70	8.82
2	6.86	20.00	2.70	12.25
3	13.72	20.00	2.70	15.68
4	20.57	20.00	2.70	19.10
INT DECK 2.				
GIRDER				
1	0.00	12.25	2.70	15.53
2	6.86	12.25	2.70	18.96
3	13.72	12.25	2.70	22.39
BOTTOM				
GIRDER				
1	0.00	0.00	0.29	34.01
2	4.11	0.31	0.29	33.70
3	8.23	1.00	0.29	33.01
4	12.34	2.00	0.29	32.00
5	16.46	3.45	0.29	31.30
BOTTOM				
STIFF.				
1	0.00	2.25	0.29	31.76
2	4.11	2.41	0.27	31.60
3	8.23	2.75	0.21	31.26
4	12.34	3.25	0.21	30.76
5	16.46	3.98	0.24	30.79

---------------SCANTLINGS OF GDR/STF AND PLATE-------------

	GIRDER/STIFFENER INXINXIN/IN				CATLG NO	PLATE TK, IN	SUPPORT WIDTH IN
WET DECK							
GIRDER							
1 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.29
2 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.29
3 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.29
4 *F	13.490X	5.030X	0.255/	0.420	49.	0.3438	82.29
INT DECK 1.							
GIRDER							
1 *F	9.780X	4.010X	0.240/	0.330	29.	0.2188	82.29
2 *F	11.810X	4.010X	0.235/	0.350	35.	0.2188	82.29
3 *F	11.840X	6.490X	0.230/	0.380	45.	0.2188	82.29
4 *F	11.840X	6.490X	0.230/	0.380	45.	0.2188	73.09
INT DECK 2.							
GIRDER							
1 *F	11.840X	6.490X	0.230/	0.380	45.	0.2188	82.29
2 *F	13.490X	5.030X	0.255/	0.420	49.	0.2188	82.29
3 *F	15.430X	6.990X	0.295/	0.430	67.	0.2188	106.23
BOTTOM							
GIRDER							
1	54.000X	17.190X	0.344/	0.250		0.3438	38.27
2	50.272X	15.625X	0.313/	0.250		0.3438	43.91
3	42.037X	12.500X	0.250/	0.250		0.3438	50.26
4	29.959X	12.500X	0.250/	0.250		0.3438	51.67
5	12.594X	12.594X	0.281/	0.219		0.3438	52.37

BOTTOM STIFF.							
1 *R	3.745X	3.940X	0.170/	0.205	1.	0.3438	27.00
2 *R	3.745X	3.940X	0.170/	0.205	1.	0.3125	27.00
3 *R	3.745X	3.940X	0.170/	0.205	1.	0.2500	27.00
4 *R	3.745X	3.940X	0.170/	0.205	1.	0.2500	27.00
5 *R	3.745X	3.940X	0.170/	0.205	1.	0.2813	27.00

NOTE: *F STANDS FOR FABRICATED SHAPE
*R STANDS FOR ROLLED SHAPE

----------------PROPERTIES OF GDR/STF AND PLATES----------------

	-------AREA------		N.A. TO	-----SEC MOD-----			SMEAR
	TOTAL IN2	SHEAR IN2	PLATE IN	PLATE IN3	FLANGE IN3	WT/FT LBF/FT	RATIO
WET DECK GIRDER							
1	33.84	3.63	1.74	310.21	43.13	114.93	0.20
2	33.84	3.63	1.74	310.21	43.13	114.93	0.20
3	33.84	3.63	1.74	310.21	43.13	114.93	0.20
4	33.84	3.63	1.74	310.21	43.13	114.93	0.20
INT DECK 1. GIRDER							
1	21.68	2.48	1.26	144.05	20.09	73.61	0.20
2	22.19	2.91	1.63	176.34	26.70	75.34	0.23
3	23.20	2.86	2.11	190.49	38.86	78.77	0.29
4	21.18	2.86	2.30	170.92	38.72	71.94	0.32
INT DECK 2. GIRDER							
1	23.20	2.86	2.11	190.49	38.86	78.77	0.29
2	23.56	3.60	2.35	212.27	42.30	79.99	0.31
3	30.80	4.74	2.80	318.02	67.18	104.61	0.33
BOTTOM GIRDER							
1	28.77	18.77	25.81	463.68	415.90	97.71	0.00
2	24.99	15.90	23.99	382.95	341.78	84.86	0.00
3	17.93	10.66	19.97	242.36	213.55	60.90	0.00
4	14.91	7.64	14.12	158.49	136.23	50.64	0.00
5	10.63	3.70	5.67	58.43	44.20	36.09	0.00
BOTTOM STIFF.							
1	10.72	0.73	0.60	24.43	3.93	36.41	0.16
2	9.88	0.72	0.61	23.21	3.90	33.54	0.17
3	8.19	0.71	0.67	20.21	3.84	27.81	0.21
4	8.19	0.71	0.67	20.21	3.84	27.81	0.21
5	9.04	0.72	0.64	21.81	3.87	30.68	0.19

-----------------STRENGTH AND STRESSES OF GDR.STF------------
AT DESIGN LOAD

	-PRIMARY STRESS-		-LOCAL STRESS-		--------STRENGTH--------		
	TENSION KSI	COMP. KSI	BEND. KSI	SHEAR KSI	BUCKL. KSI	ULTIMATE KSI	COLUMN KSI
WET DECK GIRDER							
1	16.11	13.43	16.00	4.64	35.83	35.87	37.43
2	16.11	13.43	16.00	4.64	35.83	35.87	37.43
3	16.11	13.43	16.00	4.64	35.83	35.87	37.43
4	16.11	13.43	16.00	4.64	35.83	35.87	37.43
INT DECK 1. GIRDER							
1	10.92	9.62	36.09	7.14	41.28	41.44	30.58
2	10.92	9.62	37.71	8.45	37.24	37.02	35.43
3	10.92	9.62	33.17	11.00	36.60	36.48	38.16
4	10.92	9.62	36.04	11.90	36.60	36.48	38.75

INT DECK 2.							
GIRDER							
1	0.00	0.00	32.86	10.89	36.60	36.48	38.16
2	0.00	0.00	36.85	10.56	35.83	35.87	39.82
3	0.00	0.00	35.37	12.23	36.16	36.12	42.11
BOTTOM GIRDER							
1	12.54	15.04	0.03	0.01	17.35	27.07	45.00
2	12.44	14.88	0.04	0.02	16.54	26.57	45.00
3	12.23	14.52	7.76	3.80	15.14	25.65	45.00
4	11.92	14.00	12.13	5.28	29.81	33.03	45.00
5	11.47	13.25	37.05	10.80	44.63	45.00	42.59
BOTTOM STIFF.							
1	11.84	13.87	33.24	11.19	44.66	45.00	31.28
2	11.79	13.79	33.33	11.22	44.66	45.00	32.01
3	11.69	13.61	33.49	11.26	44.66	45.00	33.58
4	11.53	13.35	32.95	11.08	44.66	45.00	33.58
5	11.31	12.98	32.72	11.01	44.66	45.00	32.77

-------------------FACTOR OF SAFETY OF GDR.STF-----------
AT DESIGN LOAD

	--PLATE- BUCKLING	-STIFFENER- SHEAR	--------STIFFENED PLATE----------- COMP+BEND	ULTIMATE	TENSION+BEND.
WET DECK					
GIRDER					
1	2.46	4.92	1.05	1.64	1.18
2	2.46	4.92	1.05	1.64	1.18
3	2.46	4.92	1.05	1.64	1.18
4	2.46	4.92	1.05	1.64	1.18
INT DECK 1.					
GIRDER					
1	15.97	3.19	1.05	8.72	1.05
2	12.70	2.70	1.01	7.95	1.01
3	10.54	2.07	1.15	7.12	1.15
4	8.73	1.92	1.05	6.00	1.05
INT DECK 2.					
GIRDER					
1	10.63	2.09	1.16	7.19	1.16
2	9.50	2.16	1.03	6.73	1.03
3	9.43	1.86	1.07	7.05	1.07
BOTTOM GIRDER					
1	1.15	1559.71	2.39	1.44	3.02
2	1.11	1151.28	2.41	1.43	3.04
3	4.31	6.01	4.90	5.84	4.90
4	5.57	4.32	3.13	4.94	3.13
5	3.10	2.11	1.03	2.37	1.03
BOTTOM STIFF.					
1	16.26	2.04	1.14	9.11	1.14
2	15.52	2.03	1.14	8.90	1.14
3	13.66	2.02	1.13	8.22	1.13
4	13.88	2.06	1.15	8.35	1.15
5	14.97	2.07	1.16	8.79	1.16

PRINTED REPORT NO. 11 - LONGITUDINAL BULKHEADS

NUMBER OF LONG BHD 0

PRINTED REPORT NO. 12 - TRANSVERSE BULKHEADS

TRANS BHD MTRL TYPE-HTS
MODULUS OF ELASTICITY, KSI 29600.0

DENSITY, LBM/FT3	489.02
YIELD STRENGTH, KSI	45.00
MAX PRIMARY STRENGTH, KSI	21.28
ALLOWABLE WORKING STRENGTH, KSI	38.00

HULL LOADS IND-CALC

	MAX	MIN
STIFFENER SPACING, IN	24.00	24.00

SEGMENT GEOMETRY

	--------NODE COORD, FT			--------------------	SCND. LOAD, FT--	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
1	0.00	30.01	0.00	20.00	21.56	
2	0.00	20.00	0.00	12.25	27.61	
3	0.00	12.25	0.00	4.50	31.32	

SEGMENT SCANTLINGS

	----------------SCANTLINGS OF STIFFENED PLATES----------------							
	STIFFENERS				CATLG	NO.OF	PLATE	SPACING
SEG	---------INXINXIN/IN--------------				NO	STIFF	TK, IN	IN
1 *F	7.685X	3.940X	0.170/	0.205	6	16	0.1875	24.02
2 *R	5.735X	3.970X	0.200/	0.225	5	15	0.1875	23.25
3 *F	7.685X	3.940X	0.170/	0.205	6	15	0.1875	23.25

NOTE: *F STANDS FOR FABRICATED SHAPE
*R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

	----------------PROPERTIES OF STIFFENED PLATES----------------						
	------AREA------		N.A. TO	-----SEC MOD-----			SMEAR
	TOTAL	SHEAR	PLATE	PLATE	FLANGE	WT/FT	RATIO
SEG	IN2	IN2	IN	IN3	IN3	LBF/FT	
1	6.61	1.37	1.83	31.02	9.09	22.46	0.47
2	6.40	1.23	1.45	22.62	7.00	21.73	0.47
3	6.47	1.37	1.87	30.14	9.07	21.97	0.48

	----------STRENGTH AND STRESSES---------- AT DESIGN LOAD				
	--LOCAL STRESS--		--------STRENGTH--------		
	BEND. KSI	SHEAR KSI	BUCKL. KSI	ULTIMATE KSI	COLUMN KSI
SEG					
1	35.15	8.51	10.89	22.43	35.79
2	37.90	9.78	10.89	22.43	35.79
3	34.11	11.53	10.89	22.43	35.79

	----------------------FACTOR OF SAFETY---------------------- AT DESIGN LOAD				
	--PLATE-	-STIFFENER-	--------STIFFENED PLATE-----------		
	BUCKLING	SHEAR	COMP+BEND	ULTIMATE	TENSION+BEND.
SEG					
1	3.91	2.68	1.08	5.12	1.74
2	3.91	2.33	1.00	5.12	1.74
3	3.91	1.98	1.11	5.12	1.74

PRINTED REPORT NO. 13 - SIDE AND BOTTOM FRAMES

FRAME SPACING, FT 8.00

SEGMENT GEOMETRY

	--------NODE COORD, FT			--------------------	SCND. LOAD, FT--	
SEG	YUPR	ZUPR	YLWR	ZLWR	HEAD1	HEAD2
SIDE FRAME						
SEG						
1	27.43	30.01	25.90	20.00	14.01	
2	25.90	20.00	24.56	12.25	21.76	
3	24.56	12.25	18.57	4.50	29.51	

BOT FRAME

SEG					
1	18.57	4.50	16.46	3.45	30.56
2	16.46	3.45	12.34	2.00	32.00
3	12.34	2.00	8.23	1.00	33.01
4	8.23	1.00	4.11	0.31	33.70
5	4.11	0.31	0.00	0.00	34.01

SEGMENT SCANTLINGS

	----------------SCANTLINGS OF STIFFENED PLATES-----------------						
	STIFFENERS ---------INXINXIN/IN--------------				CATLG NO	PLATE TK, IN	SPAN FT
SIDE FRAME SEG							
1 *F	11.810X	4.010X	0.235/	0.350	35.	0.2500	10.01
2 *F	11.810X	4.010X	0.235/	0.350	35.	0.2500	7.75
3 *F	13.405X	5.000X	0.230/	0.335	40.	0.2813	7.75
BOT FRAME SEG							
1	6.297X	6.297X	0.219/	0.219		0.3438	2.36
2	21.277X	12.500X	0.250/	0.250		0.3438	4.36
3	35.998X	12.500X	0.250/	0.250		0.3438	4.24
4	46.154X	12.500X	0.250/	0.250		0.3438	4.17
5	52.136X	12.500X	0.250/	0.250		0.3438	4.13

NOTE: *F STANDS FOR FABRICATED SHAPE

SEGMENT PROPERTIES

	----------------PROPERTIES OF STIFFENED PLATES------------------						
	------AREA------		N.A. TO	-----SEC MOD-----			SMEAR
SEG	TOTAL IN2	SHEAR IN2	PLATE IN	PLATE IN3	FLANGE IN3	WT/FT LBF/FT	RATIO
SIDE FRAME SEG							
1	28.18	2.92	1.32	225.92	26.95	95.70	0.17
2	28.18	2.92	1.32	225.92	26.95	95.70	0.17
3	31.76	3.22	1.53	290.81	35.58	107.87	0.18
BOT FRAME SEG							
1	4.92	1.50	2.94	14.13	10.62	16.71	0.18
2	12.74	5.47	9.98	105.46	88.45	43.27	0.18
3	16.42	9.15	17.04	198.95	173.32	55.77	0.18
4	18.96	11.69	21.98	273.67	242.77	64.39	0.18
5	20.46	13.18	24.90	321.62	287.78	69.47	0.18

STRESS AND FACTOR OF SAFETY

	-STRESS, KSI-		------FOS-----	
	BENDING	SHEAR	BENDING	SHEAR
SIDE FRAME SEG				
1	36.00	12.38	1.06	1.84
2	33.53	14.89	1.13	1.53
3	34.55	18.26	1.10	1.25
BOT FRAME SEG				
1	17.31	12.36	2.20	1.85
2	7.83	6.58	4.85	3.47
3	3.95	3.94	9.61	5.79
4	2.82	3.10	13.49	7.36
5	2.36	2.74	16.10	8.31

PRINTED REPORT NO. 14 - DECK BEAMS

FRAME SPACING, FT 8.00

SEGMENT GEOMETRY

SEG	YIB	ZIB	YOB	ZOB	HEAD1	HEAD2
	NODE COORD, FT				SCND. LOAD, FT	
WET DECK SEG						
1	0.00	30.01	6.86	30.01	8.40	
2	6.86	30.01	13.72	30.01	8.40	
3	13.72	30.01	20.57	30.01	8.40	
4	20.57	30.01	27.43	30.01	8.40	
DECK NO. 1 SEG						
1	0.00	20.00	6.86	20.00	2.70	
2	6.86	20.00	13.72	20.00	2.70	
3	13.72	20.00	20.57	20.00	2.70	
4	20.57	20.00	25.90	20.00	2.81	
DECK NO. 2 SEG						
1	0.00	12.25	6.86	12.25	2.70	
2	6.86	12.25	13.72	12.25	2.70	
3	13.72	12.25	24.56	12.25	2.70	

SEGMENT SCANTLINGS

SEG	STIFFENERS INXINXIN/IN				CATLG NO	PLATE TK, IN	SPAN FT
	SCANTLINGS OF STIFFENED PLATES						
WET DECK SEG							
1 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
2 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
3 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
4 *R	5.735X	3.970X	0.200/	0.225	5.	0.3438	6.86
DECK NO. 1 SEG							
1 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
2 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
3 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
4 *R	3.745X	3.940X	0.170/	0.205	1.	0.2813	5.32
DECK NO. 2 SEG							
1 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
2 *R	3.745X	3.940X	0.170/	0.205	1.	0.2188	6.86
3 *F	5.685X	3.940X	0.170/	0.215	3.	0.2188	10.85

NOTE: *F STANDS FOR FABRICATED SHAPE
*R STANDS FOR ROLLED SHAPE

SEGMENT PROPERTIES

SEG	AREA TOTAL IN2	AREA SHEAR IN2	N.A. TO PLATE IN	SEC MOD PLATE IN3	SEC MOD FLANGE IN3	WT/FT LBF/FT	SMEAR RATIO
	PROPERTIES OF STIFFENED PLATES						
WET DECK SEG							
1	35.04	1.26	0.42	103.33	7.46	119.01	0.06
2	35.04	1.26	0.42	103.33	7.46	119.01	0.06
3	35.04	1.26	0.42	103.33	7.46	119.01	0.06
4	35.04	1.26	0.42	103.33	7.46	119.01	0.06
DECK NO. 1 SEG							
1	22.44	0.71	0.31	48.67	3.88	76.22	0.07
2	22.44	0.71	0.31	48.67	3.88	76.22	0.07
3	22.44	0.71	0.31	48.67	3.88	76.22	0.07
4	28.44	0.72	0.30	51.70	3.93	96.60	0.05
DECK NO. 2 SEG							
1	22.44	0.71	0.31	48.67	3.88	76.22	0.07

```
   2     22.44     0.71      0.31       48.67     3.88     76.22     0.07
   3     22.81     1.04      0.45       83.34     6.66     77.48     0.09

        STRESS AND FACTOR OF SAFETY
        -STRESS, KSI-     ------FOS-----
        BENDING  SHEAR    BENDING  SHEAR
 WET DECK
   SEG
   1     35.05    11.76     1.08     1.94
   2     35.05    11.76     1.08     1.94
   3     35.05    11.76     1.08     1.94
   4     35.05    11.76     1.08     1.94
 DECK NO.  1
   SEG
   1     21.88     6.74     1.74     3.38
   2     21.88     6.74     1.74     3.38
   3     21.88     6.74     1.74     3.38
   4     13.50     5.36     2.82     4.26
 DECK NO.  2
   SEG
   1     21.88     6.74     1.74     3.38
   2     21.88     6.74     1.74     3.38
   3     31.87     7.26     1.19     3.14

PRINTED REPORT NO. 15 - LONGITUDINAL BULKHEAD VERTICAL STIFFENERS

  NUMBER OF LONG BHD  0

C,E>RUN,APPEN
COMMAND STRING IS:
  RUN,APPENDAGE MODULE
** WARNING - APPENDAGE MODULE ** (W-FINROTATSHIFT-FINREP)
FWD FINS HAVE BEEN RE-POSITIONED BY SHIFTING FIN ROOT
Z-COORD.   -0.74 FT (UPWARD POSITIVE) AND BY ROTATING
ABOUT FIN ROOT   10.00 DEG (CLOCKWISE POSITIVE).
** WARNING - APPENDAGE MODULE ** (W-FINSPANRESIZE-FINRES)
FWD FINS HAVE BEEN RESIZED:
    CHANGE IN CHORD          0.77 FT
    CHANGE IN THK           0.12 FT
     CHANGE IN SPAN         -0.72 FT
    CHANGE IN AREA           0.00 FT2

   ASSET/MONOSC VERSION 3.3+ - APPENDAGE MODULE - 2/11/95  11.01.00.

PRINTED REPORT NO. 1 - SUMMARY

APPENDAGE DISP, LTON          86.6

SHELL DISP, LTON              15.0

SKEG IND                   PRESENT    RUDDER TYPE IND               SPADE
SKEG DISP, LTON               10.0    NO RUDDERS                        2
SKEG AFT LIMIT/LBP          0.8597    AVG RUDDER CHORD, FT           9.96
SKEG THK, FT                  1.00    RUDDER THK, FT                 1.11
SKEG PROJECTED AREA, FT2     350.1    RUDDER SPAN, FT               12.11
                                      RUDDER PROJECTED AREA, FT2    120.6
BILGE KEEL IND             PRESENT    RUDDER DISP, LTON               5.1
BILGE KEEL DISP, LTON          5.8
BILGE KEEL LGTH, FT          89.78    FIN SIZE IND                   CALC
                                      NO FIN PAIRS                      1
SHAFT SUPPORT TYPE IND         POD    FWD FIN
SHAFT SUPPORT DISP, LTON      43.1       CHORD, FT                  11.10
SHAFT DISP, LTON               0.0       THK, FT                     1.66
                                         SPAN, FT                    9.62
PROP TYPE IND                   FP       PROJECTED AREA, FT2        106.7
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PROP BLADE DISP, LTON	0.8	DISP, LTON (PER PAIR)	6.8
NO PROP SHAFTS	2	AFT FIN	
PROP DIA, FT	11.58	CHORD, FT	
		THK, FT	
SONAR DOME IND	NONE	SPAN, FT	
SONAR DISP, LTON	0.0	PROJECTED AREA, FT2	
		DISP, LTON (PER PAIR)	

PRINTED REPORT NO. 2 - APPENDAGE BUOYANCY AND WEIGHT

APPENDAGE	DISP, LTON	----CENTER OF BUOYANCY---- X, FT	Y, FT	Z, FT
SHELL	15.0	195.70	0.00	9.69
SKEG	10.0	296.00	0.00	2.56
BILGE KEELS*	5.8	147.25	18.08	6.22
PODS*	43.1	354.79	8.22	4.03
PROP BLADES*	0.8	345.68	8.22	2.35
RUDDERS*	5.1	372.86	8.22	7.04
ROLL FIN PAIR*	6.8	209.00	21.72	0.90
TOTAL, LTON	86.6			

* TRANSVERSE C.B. PER SIDE IS SHOWN

SWBS114, SHLL APNDG, LTON 17.14 SWBS565, ROLL FINS, LTON 37.36

C,E>RUN,RESI

COMMAND STRING IS:

RUN,RESISTANCE MODULE

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 2/11/95 11.01.11.

PRINTED REPORT NO. 1 - SUMMARY

RESID RESIST IND	NRC	BILGE KEEL IND	PRESENT
FRICTION LINE IND	ITTC	SHAFT SUPPORT TYPE IND	POD
ENDUR DISP IND	AVG DISP	PRPLN SYS RESIST IND	CALC
ENDUR CONFIG IND	NO TS	PROP TYPE IND	FP
SONAR DRAG IND		SONAR DOME IND	NONE
SKEG IND	PRESENT	RUDDER TYPE IND	SPADE
FULL LOAD WT, LTON	3813.4	CORR ALW	0.00050
AVG ENDUR DISP, LTON	3591.0	DRAG MARGIN FAC	0.080
USABLE FUEL WT, LTON	517.1	TRAILSHAFT PWR FAC	
NO RUDDERS	2.		
NO FIN PAIRS	1.	PRPLN SYS RESIST FRAC	
PROP TIP CLEAR RATIO	0.25	MAX SPEED	0.190
NO PROP SHAFTS	2.	SUSTN SPEED	0.211
PROP DIA, FT	11.58	ENDUR SPEED	0.400

CONDITION	SPEED KT	----EFFECTIVE HORSEPOWER, HP---- FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
MAX	26.04	5699.	7711.	4054.	216.	1414.	19095.	238929.
SUSTN	25.00	5060.	5549.	3538.	191.	1147.	15486.	201858.
ENDUR	14.00	909.	447.	766.	34.	172.	2328.	54182.

PRINTED REPORT NO. 2 - SPEED-POWER MATRIX

RESID RESIST IND	NRC
ENDUR DISP IND	AVG DISP

SPEED AND POWER FOR FULL LOAD DISP
=====================================

FULL LOAD WT, LTON 3813.4

SPEED KT	FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
	------------EFFECTIVE HORSEPOWER, HP------------						
2.00	3.	0.	7.	0.	1.	11.	1847.
4.00	25.	3.	35.	1.	5.	70.	5681.
6.00	80.	18.	95.	3.	16.	211.	11447.
8.00	185.	55.	191.	6.	35.	473.	19280.
10.00	353.	135.	333.	12.	67.	901.	29363.
12.00	600.	281.	527.	21.	114.	1543.	41892.
14.00	938.	416.	765.	34.	172.	2325.	54128.
16.00	1383.	502.	1050.	50.	239.	3224.	65662.
18.00	1947.	836.	1420.	71.	342.	4617.	83579.
20.00	2645.	1374.	1870.	98.	479.	6466.	105349.
22.00	3489.	2205.	2410.	130.	659.	8894.	131736.
24.00	4493.	4040.	3110.	169.	945.	12757.	173218.
26.00	5671.	7609.	4031.	215.	1402.	18929.	237239.
28.00	7036.	15094.	5357.	269.	2220.	29977.	348871.

SPEED AND POWER FOR AVE ENDUR DISP
=====================================

AVE ENDUR DISP, LTON 3591.0

SPEED KT	FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
	------------EFFECTIVE HORSEPOWER, HP------------						
2.00	3.	0.	7.	0.	1.	11.	1818.
4.00	24.	3.	35.	1.	5.	68.	5573.
6.00	78.	16.	94.	3.	15.	206.	11196.
8.00	179.	52.	190.	6.	34.	462.	18812.
10.00	342.	127.	330.	12.	65.	877.	28587.
12.00	581.	264.	522.	22.	111.	1499.	40706.
14.00	909.	447.	766.	34.	172.	2328.	54182.
16.00	1340.	664.	1064.	51.	249.	3368.	68597.
18.00	1886.	991.	1430.	73.	350.	4731.	85647.
20.00	2562.	1512.	1875.	100.	484.	6533.	106436.
22.00	3380.	2386.	2417.	133.	665.	8981.	133026.
24.00	4353.	4509.	3142.	172.	974.	13149.	178535.
26.00	5494.	8078.	4058.	219.	1428.	19277.	241605.
28.00	6816.	13845.	5227.	273.	2093.	28254.	328822.

PRINTED REPORT NO. 3 - SHIP GEOMETRIC DATA FOR RESISTANCE COMPUTATIONS

RESID RESIST IND NRC
ENDUR DISP IND AVG DISP

	FULL LOAD	AVE ENDUR DISP
BARE HULL DISP, LTON	3726.8	3504.5
APPENDAGE DISP, LTON	86.6	86.6
TOTAL DISP, LTON	3813.4	3591.0
LBP, FT	380.00	380.00
WL LENGTH, FT	379.79	379.53
BEAM AT MAX AREA STA, FT	50.94	50.81
DRAFT AT MAX AREA STA, FT	15.12	14.56
TAYLOR WETTED SURF AREA, FT2	19347.1	18828.5
SHIP WETTED SURF AREA, FT2	19347.1	18828.5
SKEG WETTED SURF AREA, FT2	700.3	700.3
WIND FRONT AREA, FT2	1682.9	1711.2
FROUDE WETTED SURF COEF	7.2802	7.3470
LENGTH-BEAM RATIO	7.4562	7.4689

BEAM-DRAFT RATIO	3.3690	3.4892
PRISMATIC COEF	0.5640	0.5566
MAX SECTION COEF	0.7901	0.7840
DISP-LENGTH RATIO	68.0321	64.1060
LCB-LENGTH RATIO	0.5006	0.4964
HALF ANG ENTRANCE, DEG	8.53	8.27
HALF ANG RUN, DEG	10.31	27.05
TRANSOM BUTTOCK ANG, DEG	5.96	5.96
BOW SECT AREA COEF	0.0000	0.0000
TRANSOM SECT AREA COEF	0.0203	0.0020
TRANSOM BREADTH COEF	0.5332	0.2111
TRANSOM DEPTH COEF	0.0484	0.0121

PRINTED REPORT NO. 4 - APPENDAGE DATA

SKEG IND	PRESENT
SKEG AREA, FT2	350.1
BILGE KEEL IND	PRESENT
SHAFT SUPPORT TYPE IND	POD
POD STRUT CHORD LGTH, FT	8.47
POD STRUT THICKNESS, FT	2.45
POD BARREL LGTH, FT	24.21
POD BARREL DIA, FT	7.35
POD STRUT TE OFFSET, FT	7.65
NO PROP SHAFTS	2.
WET SHAFT LGTH (PORT), FT	0.00
WET SHAFT LGTH (STBD), FT	0.00
INTRMDT SHAFT DIA, FT	
PROP TYPE IND	FP
PROP DIA, FT	11.58
SONAR DOME IND	NONE
SONAR DRAG IND	
SONAR SECT AREA, FT2	
NO RUDDERS	2.
RUDDER AREA, FT2	120.6
NO FIN PAIRS	1.
ROLL FIN AREA, FT2	213.5

```
C,E>RUN,RESI
COMMAND STRING IS:
  RUN,RESISTANCE MODULE
```

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 2/11/95 11.12.43.

PRINTED REPORT NO. 1 - SUMMARY

RESID RESIST IND	NRC	BILGE KEEL IND	PRESENT
FRICTION LINE IND	ITTC	SHAFT SUPPORT TYPE IND	POD
ENDUR DISP IND	AVG DISP	PRPLN SYS RESIST IND	CALC
ENDUR CONFIG IND	NO TS	PROP TYPE IND	FP
SONAR DRAG IND		SONAR DOME IND	NONE
SKEG IND	PRESENT	RUDDER TYPE IND	SPADE
FULL LOAD WT, LTON	3813.4	CORR ALW	0.00050
AVG ENDUR DISP, LTON	3591.0	DRAG MARGIN FAC	0.080
USABLE FUEL WT, LTON	517.1	TRAILSHAFT PWR FAC	
NO RUDDERS	2.		
NO FIN PAIRS	1.	PRPLN SYS RESIST FRAC	
PROP TIP CLEAR RATIO	0.25	MAX SPEED	0.190

NO PROP SHAFTS	2.	SUSTN SPEED	0.211
PROP DIA, FT	11.58	ENDUR SPEED	0.400

CONDITION	SPEED KT	FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
		EFFECTIVE HORSEPOWER, HP						
MAX	26.04	5699.	7711.	4054.	216.	1414.	19095.	238929.
SUSTN	25.00	5060.	5549.	3538.	191.	1147.	15486.	201858.
ENDUR	14.00	909.	447.	766.	34.	172.	2328.	54182.

PRINTED REPORT NO. 2 - SPEED-POWER MATRIX

RESID RESIST IND	NRC
ENDUR DISP IND	AVG DISP

SPEED AND POWER FOR FULL LOAD DISP
===================================

FULL LOAD WT, LTON 3813.4

SPEED KT	FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
	EFFECTIVE HORSEPOWER, HP						
2.00	3.	0.	7.	0.	1.	11.	1847.
4.00	25.	3.	35.	1.	5.	70.	5681.
6.00	80.	18.	95.	3.	16.	211.	11447.
8.00	185.	55.	191.	6.	35.	473.	19280.
10.00	353.	135.	333.	12.	67.	901.	29363.
12.00	600.	281.	527.	21.	114.	1543.	41892.
14.00	938.	416.	765.	34.	172.	2325.	54128.
16.00	1383.	502.	1050.	50.	239.	3224.	65662.
18.00	1947.	836.	1420.	71.	342.	4617.	83579.
20.00	2645.	1374.	1870.	98.	479.	6466.	105349.
22.00	3489.	2205.	2410.	130.	659.	8894.	131736.
24.00	4493.	4040.	3110.	169.	945.	12757.	173218.
26.00	5671.	7609.	4031.	215.	1402.	18929.	237239.
28.00	7036.	15094.	5357.	269.	2220.	29977.	348871.

SPEED AND POWER FOR AVE ENDUR DISP
===================================

AVE ENDUR DISP, LTON 3591.0

SPEED KT	FRIC	RESID	APPDG	WIND	MARGIN	TOTAL	DRAG LBF
	EFFECTIVE HORSEPOWER, HP						
2.00	3.	0.	7.	0.	1.	11.	1818.
4.00	24.	3.	35.	1.	5.	68.	5573.
6.00	78.	16.	94.	3.	15.	206.	11196.
8.00	179.	52.	190.	6.	34.	462.	18812.
10.00	342.	127.	330.	12.	65.	877.	28587.
12.00	581.	264.	522.	22.	111.	1499.	40706.
14.00	909.	447.	766.	34.	172.	2328.	54182.
16.00	1340.	664.	1064.	51.	249.	3368.	68597.
18.00	1886.	991.	1430.	73.	350.	4731.	85647.
20.00	2562.	1512.	1875.	100.	484.	6533.	106436.
22.00	3380.	2386.	2417.	133.	665.	8981.	133026.
24.00	4353.	4509.	3142.	172.	974.	13149.	178535.
26.00	5494.	8078.	4058.	219.	1428.	19277.	241605.
28.00	6816.	13845.	5227.	273.	2093.	28254.	328822.

PRINTED REPORT NO. 3 - SHIP GEOMETRIC DATA FOR RESISTANCE COMPUTATIONS

RESID RESIST IND	NRC
ENDUR DISP IND	AVG DISP

	FULL LOAD	AVE ENDUR DISP
BARE HULL DISP, LTON	3726.8	3504.5
APPENDAGE DISP, LTON	86.6	86.6
TOTAL DISP, LTON	3813.4	3591.0
LBP, FT	380.00	380.00
WL LENGTH, FT	379.79	379.53
BEAM AT MAX AREA STA, FT	50.94	50.81
DRAFT AT MAX AREA STA, FT	15.12	14.56
TAYLOR WETTED SURF AREA, FT2	19347.1	18828.5
SHIP WETTED SURF AREA, FT2	19347.1	18828.5
SKEG WETTED SURF AREA, FT2	700.3	700.3
WIND FRONT AREA, FT2	1682.9	1711.2
FROUDE WETTED SURF COEF	7.2802	7.3470
LENGTH-BEAM RATIO	7.4562	7.4689
BEAM-DRAFT RATIO	3.3690	3.4892
PRISMATIC COEF	0.5640	0.5566
MAX SECTION COEF	0.7901	0.7840
DISP-LENGTH RATIO	68.0321	64.1060
LCB-LENGTH RATIO	0.5006	0.4964
HALF ANG ENTRANCE, DEG	8.53	8.27
HALF ANG RUN, DEG	10.31	27.05
TRANSOM BUTTOCK ANG, DEG	5.96	5.96
BOW SECT AREA COEF	0.0000	0.0000
TRANSOM SECT AREA COEF	0.0203	0.0020
TRANSOM BREADTH COEF	0.5332	0.2111
TRANSOM DEPTH COEF	0.0484	0.0121

PRINTED REPORT NO. 4 - APPENDAGE DATA

SKEG IND	PRESENT
SKEG AREA, FT2	350.1
BILGE KEEL IND	PRESENT
SHAFT SUPPORT TYPE IND	POD
POD STRUT CHORD LGTH, FT	8.47
POD STRUT THICKNESS, FT	2.45
POD BARREL LGTH, FT	24.21
POD BARREL DIA, FT	7.35
POD STRUT TE OFFSET, FT	7.65
NO PROP SHAFTS	2.
WET SHAFT LGTH (PORT), FT	0.00
WET SHAFT LGTH (STBD), FT	0.00
INTRMDT SHAFT DIA, FT	
PROP TYPE IND	FP
PROP DIA, FT	11.58
SONAR DOME IND	NONE
SONAR DRAG IND	
SONAR SECT AREA, FT2	
NO RUDDERS	2.
RUDDER AREA, FT2	120.6
NO FIN PAIRS	1.
ROLL FIN AREA, FT2	213.5

```
C,E>RUN,PROP
COMMAND STRING IS:
  RUN,PROPELLER MODULE
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ASSET/MONOSC VERSION 3.3+ - PROPELLER MODULE - 2/11/95 11.13.09.

PRINTED REPORT NO. 1 - SUMMARY

ENDUR CONFIG IND	NO TS		
PROP TYPE IND	FP	PROP SERIES IND	ANALYTIC
PROP DIA IND	CALC	PROP LOC IND	CALC
PROP AREA IND	CALC	PROP ID IND	
SHAFT SUPPORT TYPE IND	POD	RUDDER TYPE IND	SPADE
MAX SPEED, KT	26.04	ENDUR SPEED, KT	14.00
MAX EHP (/SHAFT), HP	9548.	ENDUR EHP (/SHAFT), HP	1164.
MAX SHP (/SHAFT), HP	13637.	ENDUR SHP (/SHAFT), HP	1613.
MAX PROP RPM	220.0	ENDUR PROP RPM	111.5
MAX PROP EFF	0.700	ENDUR PROP EFF	0.721
SUSTN SPEED, KT	25.00	PROP DIA, FT	11.58
SUSTN EHP (/SHAFT), HP	7743.	NO BLADES	7.
SUSTN SHP (/SHAFT), HP	10928.	PITCH RATIO	1.27
SUSTN PROP RPM	206.7	EXPAND AREA RATIO	0.890
SUSTN PROP EFF	0.709	CAVITATION NO	1.69
NO PROP SHAFTS	2.0		
TOTAL PROPELLER WT, LTON	13.33		

PRINTED REPORT NO. 2 - PROPELLER CHARACTERISTICS

PROP ID IND	
NO PROP SHAFTS	2.
PROP DIA, FT	11.58
NO BLADES	7.
PITCH RATIO	1.27
EXPAND AREA RATIO	0.890
THRUST DED COEF	0.050
TAYLOR WAKE FRAC	0.050
HULL EFFICIENCY	1.000
REL ROTATE EFF	1.000

CHARACTERISTICS	CONDITIONS MAXIMUM	CONDITIONS SUSTAINED	CONDITIONS ENDURANCE
SPEED, KT	26.04	25.00	14.00
RPM	220.0	206.7	111.5
THRUST/SHAFT, LBF	125754.	106242.	28517.
EHP/SHAFT, HP	9548.	7743.	1164.
TORQUE/SHAFT, FT-LBF	325554.	277711.	75971.
SHP/SHAFT, HP	13637.	10928.	1613.
ADVANCE COEF (J)	0.984	1.005	1.043
THRUST COEF (KT)	0.262	0.250	0.231
TORQUE COEF (10KQ)	0.585	0.565	0.531
OPEN WATER EFFY	0.700	0.709	0.721
PC	0.700	0.709	0.721

PRINTED REPORT NO. 3 - CAVITATION CHARACTERISTICS

MAX SPEED OF ADV, KT	24.74
MAX THRUST, LBF	125754.
MAX PROP RPM	220.0
PROP DIA, FT	11.58
HUB DEPTH, FT	12.77
STD CAV NO	1.69
LOCAL CAV NO (.7R)	0.28
MEAN THRUST LOADING COEF	0.17
EXPAND AREA RATIO	0.890

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MIN EAR REQUIRED              0.890
BACK CAV ALLOWED, PERCENT      10.0


PRINTED REPORT NO. 4 - PROPELLER ARRANGEMENT

PROP DIA, FT                  11.58
FULL LOAD DRAFT, FT           15.12
HUB DEPTH FROM DWL, FT        12.77
LONG LOC FROM AP, FT          34.31
HUB POS FROM CL, FT            8.22
TIP CLR FROM BL, FT           -3.44
TIP CLR FROM MAX HB, FT       13.43
TIP CLR FROM HULL BOT, FT      2.74

TOTAL PROPELLER WT, LTON      13.33
C,E>RUN,MACH
COMMAND STRING IS:
  RUN,MACHINERY MODULE
** WARNING - MACHINERY MODULE ** (W-TORQGOVRNSHDIA-SHSIZN)
PROPELLER SHAFT DIAMETER IS GOVERNED BY TORQUE.
** WARNING - MACHINERY MODULE ** (W-MRDIM2SMALL-MRDIMR)
DIMENSIONS OF THE FOLLOWING MACHINERY ROOMS ARE TOO SMALL
TO ENCLOSE MACHINERY : 2
** WARNING - MACHINERY MODULE ** (W-LT1ENGPERSHAFTE-MHYMSG)
LESS THAN ONE PROPULSION ENGINE PER PROPELLER SHAFT IS OPERATING
AT ENDURANCE (DUE TO SELECTION OF VALUES WITHIN THE  PARAMETER
ELECT PG ARR OP ARRAY). THIS IS NOT CURRENT STANDARD NAVAL PRACTICE.
** WARNING - MACHINERY MODULE ** (W-TOTALSSGENLT3-MHYMSG)
TOTAL NUMBER OF SHIP SERVICE GENERATORS (INCLUDING VSCF, IF ANY),
IS LESS THAN THREE.
** WARNING - MACHINERY MODULE ** (W-ZEROSBYSSGEN-MHYMSG)
NO STANDBY SHIP-SERVICE GENERATORS EXIST AT BATTLE ELECTRICAL
LOADING CONDITION.
** WARNING - MACHINERY MODULE ** (W-OPSSGENENDURLT2-MHYMSG)
NUMBER OF SHIP SERVICE GENERATORS OPERATING AT ENDURANCE CONDITION IS
LESS THAN TWO.

   ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 2/11/95  11.16.47.

PRINTED REPORT NO. 1 - SUMMARY

TRANS TYPE IND                 ELECT    MAX SPEED, KT                 26.04
ELECT PRPLN TYPE IND         ACR-DCS    SUSTN SPEED IND               GIVEN
SHAFT SUPPORT TYPE IND           POD    SUSTN SPEED, KT               25.00
NO PROP SHAFTS                    2.    ENDUR SPEED IND               GIVEN
ENDUR CONFIG IND               NO TS    ENDUR SPEED, KT               14.00
SEC ENG USAGE IND                       DESIGN MODE IND           ENDURANCE
MAX MARG ELECT LOAD, KW        2564.    ENDURANCE, NM                 8000.
AVG 24 HR ELECT LOAD, KW       1075.    USABLE FUEL WT, LTON          517.1
SWBS 200 GROUP WT, LTON        272.3    SUSTN SPEED POWER FRAC         0.80
SWBS 300 GROUP WT, LTON        248.0
                                              NO      NO ONLINE  NO ONLINE
ARRANGEMENT OR SS GEN             TYPE     INSTALLED  MAX+SUSTN  ENDURANCE
-------------------------   ----------     ---------  ---------  ---------
ELECT PG ARR 1 IND                M-PG         2          2          1
ELECT PG ARR 2 IND                             0          0          0
ELECT DL ARR IND                   MTR         2          2          2
SEP SS GEN                    2738. KW         2          2          1
VSCF SS CYCLO                       KW         0          0          0

                          MAIN ENG          SEC ENG             SS ENG
                      ---------------   ---------------   ---------------
ENG SELECT IND                  GIVEN                               GIVEN
ENG MODEL IND          GE-LM1600-VAN2                            A-12V270
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ENG TYPE IND	RGT		D DIESEL
ENG SIZE IND	CALC		CALC
NO INSTALLED	2	0	2
ENG PWR AVAIL, HP	15108.		3820.
ENG RPM	4627.8		900.0
ENG SFC, LBM/HP-HR	0.347		.337
ENG LOAD FRAC	1.000		1.000

PRINTED REPORT NO. 2 - MACHINERY EQUIPMENT LIST

NO EACH	ITEM	WEIGHT LTON	LENGTH FT	WIDTH FT	HEIGHT FT
	PROPULSION PLANT				
2	MAIN ENGINE (BARE)	1.5	9.33	4.36	4.36
2	MAIN ENGINE ENCLOSURE MODULE	7.8	18.48	7.86	7.16
2	MAIN ENGINE INTERCOOLER	2.0	4.37	4.94	4.94
0	SEC ENGINE (BARE)				
0	SEC ENGINE ENCLOSURE MODULE				
0	SEC ENGINE INTERCOOLER				
0	RACER STEAM TURBINE				
0	RACER CONDENSER				
0	LTDR GEAR (01)				
0	EPIC REV PINION GEAR (02)				
0	FRANCO TOSI REV GEAR (03)				
0	VSCF COMB/STEP-UP GEAR (04)				
0	RACER REDUCTION GEAR (05)				
0	2 SPD SOLAR EPIC GEAR (06)				
0	OFFSET GEAR (07)				
0	OFFSET COMB (2-1) GEAR (08)				
0	OFFSET COMB (3-2) GEAR (09)				
0	CR EPIC GEAR (10)				
0	Z DRIVE SPIRAL BVL GEAR (11)				
0	PLANETARY REDUCTION GEAR(12)				
0	CR BI-COUPLED EPIC GEAR (13)				
0	STAR EPIC REV GEAR (14)				
0	STAR EPIC REDUCTION GEAR(15)				
0	COMBINING STEP-UP GEAR (16)				
2	PROPULSION GENERATOR	12.9	13.34	5.34	5.34
2	PROPULSION MOTOR	13.9	8.46	4.42	4.42
2	THRUST BEARING	2.8	2.39	3.34	3.34
2	PROPELLER SHAFT				
	ELECTRIC PLANT				
2	SS ENGINE (BARE)	21.0	16.29	6.21	7.84
0	SS ENGINE ENCLOSURE MODULE				
0	SS REDUCTION GEAR (17)				
2	SEPARATE SS GENERATOR	12.2	6.92	5.09	6.59
0	VSCF SS GENERATOR				
0	VSCF SS CYCLOCONVERTER				

PRINTED REPORT NO. 3 - ENGINES

	MAIN ENG	SEC ENG	SS ENG
ENG SELECT IND	GIVEN		GIVEN
ENG TYPE IND	RGT		D DIESEL
ENG MODEL IND	GE-LM1600-VAN2		A-12V270
ENG SIZE IND	CALC		CALC
NO INSTALLED	2	0	2
ENG BARE WT, LTON	1.5		21.0
ENG LENGTH, FT	9.33		16.29
ENG WIDTH, FT	4.36		6.21
ENG HEIGHT, FT	4.36		7.84
ENG PWR AVAIL, HP	15108.		3820.0

ENG RPM	4627.8		900.0
ENG MASS FL, LBM/SEC	70.9		13.2
ENG EXH TEMP, DEGF	677.5		819.8
ENG SFC EQN IND	POLY QN		DIESEL
ENG SFC, LBM/HP-HR	0.347		.337

MAX SPEED CONDITION

NO OPERATING	2	0	2
ENG PWR, HP	15108.		1788.7
ENG RPM	4627.8		900.0
ENG MASS FL, LBM/SEC	70.9		9.8
ENG EXH TEMP, DEGF	677.5		675.6
ENG SFC, LBM/HP-HR	.347		.339

SUSTN SPEED CONDITION

NO OPERATING	2	0	2
ENG PWR, HP	12087.		1788.7
ENG RPM	4347.5		900.0
ENG MASS FL, LBM/SEC	65.0		9.8
ENG EXH TEMP, DEGF	621.2		675.6
ENG SFC, LBM/HP-HR	.336		.339

ENDUR SPEED CONDITION

ENG ENDUR RPM IND	CALC		
NO OPERATING	1	0	1
ENG PWR, HP	3891.		1500.0
ENG RPM	4627.8		900.0
ENG MASS FL, LBM/SEC	42.0		9.2
ENG EXH TEMP, DEGF	501.1		658.0
ENG SFC, LBM/HP-HR	.342		.345

NOTE - ENGINE OPERATING DATA ARE BASED ON USE OF DFM FUEL.

PRINTED REPORT NO. 4 - GEARS

NO EACH	ITEM	WEIGHT LTON	LENGTH FT	WIDTH FT	HEIGHT FT
	2-STAGE REDUCTION GEARS				
0	LTDR GEAR (01)				
0	CR BI-COUPLED EPIC GEAR (13)				
	1ST STAGE REDUCTION GEARS				
0	OFFSET GEAR (07)				
0	OFFSET COMB (2-1) GEAR (08)				
0	OFFSET COMB (3-2) GEAR (09)				
0	STAR EPIC REDUCTION GEAR(15)				
	2ND STAGE REDUCTION GEARS				
0	CR EPIC GEAR (10)				
0	PLANETARY REDUCTION GEAR(12)				
	SPECIAL GEARS				
0	EPIC REV PINION GEAR (02)				
0	FRANCO TOSI REV GEAR (03)				
0	VSCF COMB/STEP-UP GEAR (04)				
0	RACER REDUCTION GEAR (05)				
0	2 SPD SOLAR EPIC GEAR (06)				
0	Z DRIVE SPIRAL BVL GEAR (11)				
0	STAR EPIC REV GEAR (14)				
0	COMBINING STEP-UP GEAR (16)				
0	SS REDUCTION GEAR (17)				

REDUCTION GEAR DESIGN FACTORS AND DIMENSIONS	1ST STAGE	2ND STAGE	SS
REDUCTION RATIO			
K FACTOR			
FACE WIDTH RATIO			
CASING WT FACTOR			
GEAR FACE WIDTH, FT			
PINION GEAR DIA, FT			
REDUCTION GEAR DIA, FT			
SUN GEAR DIA, FT			
PLANET GEAR DIA, FT			
RING GEAR DIA, FT			
RING GEAR THK, FT			
NO PLANETS			

PRINTED REPORT NO. 5 - ELECTRIC PROPULSION AND VSCF EQUIPMENT

TRANS TYPE IND-ELECT
ELECT PRPLN TYPE IND-ACR-DCS
SWITCHGEAR TYPE IND-ADV
TRANS LINE NODE PT IND-CALC
ELECT PRPLN RATING IND-CALC

TRANS LINE NODE PT X, FT	258.33
TRANS LINE NODE PT Y, FT	-6.10
TRANS LINE NODE PT Z, FT	15.00

MOTORS AND GENERATORS

	PRPLN GENERATOR	PRPLN MOTOR	VSCF GENERATOR
INSTALLED NUMBER	2	2	0
TYPE	AC	DCS	
FREQUENCY CONTROL	NO		
DRIVE		DIRECT	
ROTOR COOLING	AIR	LIQUID	
ROTOR TIP SPEED, FT/MIN	28500.		
STATOR COOLING	LIQUID	LIQUID	
ARM ELECT LOAD, AMP/IN	2400.		
POWER RATING, MW	14.19	10.17	
ROTATIONAL SPEED, RPM	4628.	220.	
NUMBER OF POLES	4.	6.	
LENGTH, FT	13.3	8.5	
WIDTH, FT	5.3	4.4	
HEIGHT, FT	5.3	4.4	
WEIGHT, LTON	12.9	13.9	

OTHER ELECTRIC PROPULSION AND VSCF EQUIPMENT

	WEIGHT LTON
CONTROLS	1.4
BRAKING RESISTORS	2.0
EXCITERS	7.4
SWITCHGEAR	1.5
POWER CONVERTERS	.0
DEIONIZED COOL WATER SYS	13.4
PRPLN TRANS LINE	36.8
RECTIFIERS	3.8
HELIUM REFRIGERATION SYS	4.6
VSCF CYCLOCONVERTERS	.0

PRINTED REPORT NO. 6 - SHIP SERVICE GENERATORS

SS SYS TYPE IND-SEP
GEN SIZE IND-NON STD

ELECT LOAD DES MARGIN FAC	0.200
ELECT LOAD SL MARGIN FAC	0.100
ELECT LOAD IMBAL FAC	0.900
MAX MARG ELECT LOAD, KW	2563.6
MAX STANDBY LOAD, KW	1515.3
24 HR AVG ELECT LOAD, KW	1075.0

VSCF SS CYCLOCONVERTERS

CONDITION	NO INSTALL	NO ONLINE	REQ KW/CYCLO	AVAIL KW/CYCLO	LOADING FRAC
WINTER BATTLE	0	0			0.000
WINTER CRUISE	0	0			0.000
SUMMER CRUISE	0	0			0.000
ENDURANCE(24 HR AVG)	0	0			0.000

SEPARATE SS GENERATORS

CONDITION	NO INSTALL	NO ONLINE	REQ KW/GEN	AVAIL KW/GEN	LOADING FRAC
WINTER BATTLE	2	2	1282.	2738.	0.468
WINTER CRUISE	2	1	2464.	2738.	0.900
SUMMER CRUISE	2	1	1783.	2738.	0.651
ENDURANCE(24 HR AVG)	2	1	1075.	2738.	0.393

TOTALS

CONDITION	REQ KW	AVAIL KW	LOADING FRAC
WINTER BATTLE	2564.	5475.	0.468
WINTER CRUISE	2464.	2738.	0.900
SUMMER CRUISE	1783.	2738.	0.651
ENDURANCE(24 HR AVG)	1075.	2738.	0.393

PRINTED REPORT NO. 7 - INTAKE DUCTS

INLET TYPE IND-PLENUM
DUCT SILENCING IND-BOTH
GT ENG ENCL IND-84 DBA

	MAIN ENG	SEC ENG	SS ENG
ENG TYPE	RGT		D DIESEL
INLET DUCT XSECT AREA,FT2	52.1	.0	.0
INLET DUCT XSECT LTH, FT	6.63	.0	.0
INLET DUCT XSECT WID, FT	7.86	.0	.0

MMR1

	MAIN ENG WT,LTON	MAIN ENG VCG,FT	SEC ENG WT,LTON	SEC ENG VCG,FT
INLET	0.4	36.87		
INLET DUCTING	0.8	29.72		
INLET SILENCER	1.1	35.20		
GT COOLING SUPPLY	0.8	24.57		
GT BLEED AIR SUPPLY	2.0	21.73		

MMR2

	MAIN ENG WT,LTON	MAIN ENG VCG,FT	SEC ENG WT,LTON	SEC ENG VCG,FT
INLET	0.4	35.27		
INLET DUCTING	0.7	28.92		
INLET SILENCER	1.1	35.20		
GT COOLING SUPPLY	0.7	23.98		
GT BLEED AIR SUPPLY	2.0	21.31		

NOTE - NUMERIC DATA PRESENTED ABOVE ARE ON A PER ENGINE BASIS.

TRUNK AREA AND VOLUME REQUIREMENTS

ENGINE CATEGORY	AREA,FT2 HULL	AREA,FT2 DKHS	VOLUME,FT3 HULL	VOLUME,FT3 DKHS
MAIN ENGINES	133.0	133.0	1330.	1317.
SECONDARY ENGINES	0.0	0.0	0.	0.
SHIP-SERVICE ENGINES	0.0	0.0	0.	0.
TOTALS	133.0	133.0	1330.	1317.

PRINTED REPORT NO. 8 - EXHAUST DUCTS

EXHAUST IR SUPPRESS IND-PRESENT
DUCT SILENCING IND-BOTH
GT ENG ENCL IND-84 DBA

EXHAUST STACK TEMP, DEGF	350.0
EDUCTOR DESIGN FAC	1.000

	MAIN ENG	SEC ENG	SS ENG
ENG TYPE	RGT		D DIESEL
ENG EXH TEMP, DEG	677.		820.
ENG MASS FL, LBM/SEC	70.9		13.2
EXH DUCT GAS TEMP, DEG	610.		820.
EXH DUCT GAS DEN, LBM/FT3	0.0366		.0306
EXH DUCT MASS FL, LBM/SEC	80.8		13.2
EXH DUCT AREA, FT2	20.6		4.0

MMR1

	MAIN ENG WT,LTON	MAIN ENG VCG,FT	SEC ENG WT,LTON	SEC ENG VCG,FT
EXH DUCT (TO BOILER/REG)				
EXH BOILER (RACER)				
EXH REGENERATOR	11.0	22.29		

EXH DUCT (TO STACK)	1.9	33.43
EXH SILENCER	2.9	38.03
EXH STACK	1.0	47.17
EXH SPRAY RING	.6	32.33
EXH EDUCTOR	1.6	45.63

MMR2
====

	----MAIN ENG-----		-----SEC ENG-----	
	WT,LTON	VCG,FT	WT,LTON	VCG,FT
EXH DUCT (TO BOILER/REG)				
EXH BOILER (RACER)				
EXH REGENERATOR	11.0	22.29		
EXH DUCT (TO STACK)	1.7	32.63		
EXH SILENCER	2.9	38.03		
EXH STACK	1.0	45.57		
EXH SPRAY RING	.6	31.26		
EXH EDUCTOR	1.6	44.03		

NOTE - NUMERIC DATA PRESENTED ABOVE ARE ON A PER ENGINE BASIS.

TRUNK AREA AND VOLUME REQUIREMENTS
===== ==== === ====== ============

	-----AREA,FT2----		---VOLUME,FT3----	
ENGINE CATEGORY	HULL	DKHS	HULL	DKHS
MAIN ENGINES	332.4	177.1	3324.	1753.
SECONDARY ENGINES	0.0	0.0	0.	0.
SHIP-SERVICE ENGINES	68.0	68.0	680.	672.
TOTALS	400.4	245.1	4004.	2425.

PRINTED REPORT NO. 9 - PROPELLERS AND SHAFTS

SHAFT SUPPORT TYPE IND-POD
SHAFT SYS SIZE IND-CALC
PROP TYPE IND-FP

PROP DIA, FT	11.58
HUB DIA, FT	4.86
PROP BLADE WT, LTON	3.1
PROP HUB WT, LTON	3.6
BEND STRESS CON FAC	1.000
OVRHG PROP MOM ARM RATIO	0.340
EQUIV FP PROP WT, LTON	6.7
ALLOW BEND STRESS, LBF/IN2	6000.
FATIGUE LIMIT, LBF/IN2	47500.
YIELD POINT, LBF/IN2	75000.
TORQUE MARGIN FAC	1.200
OFF-CENTER THRUST FAC	1.000
NO STRUTS PER SHAFT	0

PORT SHAFT
==========

	PROP SECTION	INTERMED SECTION	LINE SECTION
ANGLE, DEG	-5.85		
LENGTH, FT	2.89		
DIAMETER, FT	1.21		
BORE RATIO	.550		
WEIGHT, LTON	.7		
LCG, FT	348.28		

TCG, FT	-8.22
VCG, FT	2.62
FACTOR OF SAFETY	

STBD SHAFT

	PROP SECTION	INTERMED SECTION	LINE SECTION
ANGLE, DEG	-5.85		
LENGTH, FT	2.89		
DIAMETER, FT	1.21		
BORE RATIO	.550		
WEIGHT, LTON	.7		
LCG, FT	348.28		
TCG, FT	8.22		
VCG, FT	2.62		
FACTOR OF SAFETY			

PRINTED REPORT NO. 10 - STRUTS, PODS, AND RUDDERS

SHAFT SUPPORT TYPE IND-POD
SHAFT SYS SIZE IND-CALC

PROP DIA, FT	11.58
NO STRUTS PER SHAFT	0
NO SHAFTS	2
OVRHG PROP MOM ARM RATIO	0.340

STRUTS

	MAIN STRUT	INTERMED STRUT
WALL THICKNESS, FT		
CHORD, FT		
THICKNESS, FT		
BARREL LTH, FT		
BARREL DIA, FT		

PODS

STRUT WALL THICKNESS, FT	.05
STRUT CHORD, FT	8.47
STRUT THICKNESS, FT	2.45
BARREL LTH, FT	24.21
BARREL DIA, FT	7.35

RUDDERS

RUDDER TYPE IND-SPADE
RUDDER SIZE IND-CALC

NO RUDDERS	2.
RUDDER WT (PER), LTON	13.8
RUDDER DISP (PER), LTON	2.6

	CHORD,FT	THICK,FT	SPAN,FT
SPADE RUDDER	9.96	1.11	12.11

PRINTED REPORT NO. 11 - ELECTRIC LOADS

400 HZ ELECT LOAD FAC 0.200

PAYLOAD LOADS	WINTER CRUISE KW	WINTER BATTLE KW	SUMMER CRUISE KW
COMMAND AND SURVEILLANCE (60 HZ)	86.1	441.6	86.1
COMMAND AND SURVEILLANCE (400 HZ)	21.5	110.4	21.5
ARMAMENT (60 HZ)	8.0	49.6	8.0
ARMAMENT (400 HZ)	2.0	12.4	2.0
OTHER PAYLOAD (60 HZ)	0.0	0.0	0.0
OTHER PAYLOAD (400 HZ)	0.0	0.0	0.0
SUB-TOTAL	117.6	614.0	117.6

NON-PAYLOAD LOADS (* INDICATES USER ADJUSTED VALUE)

PROPULSION AND STEERING	255.4	283.4	194.0
LIGHTING	101.0	99.0	101.0
MISCELLANEOUS ELECTRIC	46.1	40.1	46.1
HEATING	598.3	305.1	29.9
VENTILATION	234.9	180.9	234.9
AIR CONDITIONING	220.6	207.4	329.2
AUXILIARY BOILER AND FRESH WATER	114.7	84.9	114.7
FIREMAIN	49.2	69.4	49.2
UNREP AND HANDLING	7.7	12.9*	7.7
MISC AUXILIARY MACHINERY	101.6	56.9	101.6
SERVICES AND WORK SPACES	42.7	14.1	42.7
SUBTOTAL	1772.1	1353.9	1251.0
TOTAL	1889.7	1967.9	1368.6
TOTAL (INCLUDING MARGINS)	2463.8	2563.6	1783.3

MAX MARG ELECT LOAD	2563.6
24 HR AVG ELECT LOAD	1075.0
CONNECTED ELECT LOAD	5215.0
ANCHOR ELECT LOAD	1515.3
VITAL ELECT LOAD	993.2
EMERGENCY ELECT LOAD	607.5
MAX STBY ELECT LOAD	1515.3

PRINTED REPORT NO. 12 - POWERING

SUSTN SPEED IND-GIVEN
ENDUR SPEED IND-GIVEN
TRANS EFF IND-CALC
100 PCT POWER TRANS EFF 0.9026
25 PCT POWER TRANS EFF 0.9124

	MAX SPEED	SUSTN SPEED	ENDUR SPEED
SHIP SPEED, KT	26.04	25.00	14.00
PROP RPM	220.0	206.7	111.5
NO OP PROP SHAFTS	2	2	2
EHP (/SHAFT), HP	9548.	7743.	1164.
PROPULSIVE COEF	0.700	0.709	0.721
ENDUR PWR ALW	1.0	1.0	1.1
SHP (/SHAFT), HP	13637.	10928.	1775.
TRANS EFFY	0.903	0.904	0.912
CP PROP TRANS EFFY MULT	1.000	1.000	1.000
PROPUL PWR (/SHAFT); HP	15108.	12087.	1945.
PD GEN PWR (/SHAFT), HP	0.	0.	0.
BHP (/SHAFT), HP	15108.	12087.	1945.

PRINTED REPORT NO. 13 - HULL STRUCTURE AND MISCELLANEOUS WEIGHT

SWBS	COMPONENT	WT,LTON	LCG,FT	VCG,FT
160	SPECIAL STRUCTURES			
161	CASTINGS, FORGINGS, AND WELDMENTS	31.4	267.80	9.30
162	STACKS AND MASTS	2.1	202.67	46.37
180	FOUNDATIONS			
182	PROPULSION PLANT FOUNDATIONS	90.3	250.18	7.47
183	ELECTRIC PLANT FOUNDATIONS	43.8	195.19	12.82

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 14 - PROPULSION PLANT WEIGHT

SWBS	COMPONENT	WT,LTON	LCG,FT	VCG,FT
200	PROPULSION PLANT	272.3	247.04	13.40
210	ENERGY GENERATING SYSTEM (NUCLEAR)	0.0	0.00	0.00
220	ENERGY GENERATING SYSTEM (NON-NUCLEAR)	0.0	0.00	0.00
230	PROPULSION UNITS	181.3	254.06	12.17
233	PROPULSION INTERNAL COMBUSTION ENGINES	0.0	0.00	0.00
234	PROPULSION GAS TURBINES	58.2	196.74	17.33
235	ELECTRIC PROPULSION	123.1	281.14	9.73
240	TRANSMISSION AND PROPULSOR SYSTEMS	20.6	347.32	2.52
241	PROPULSION REDUCTION GEARS	0.0	0.00	0.00
242	PROPULSION CLUTCHES AND COUPLINGS	0.0	0.00	0.00
243	PROPULSION SHAFTING	1.4	348.28	2.62
244	PROPULSION SHAFT BEARINGS	5.9	350.79	2.88
245	PROPULSORS	13.3	345.69	2.35
250	PRPLN SUPPORT SYS (EXCEPT FUEL+LUBE OIL)	35.0	199.33	28.20
251	COMBUSTION AIR SYSTEM	10.0	188.31	27.25
252	PROPULSION CONTROL SYSTEM	8.9	196.74	19.50
256	CIRCULATING AND COOLING SEA WATER SYSTEM	2.4	239.40	10.80
259	UPTAKES (INNER CASING)	13.6	201.98	37.76
260	PRPLN SUPPORT SYS (FUEL+LUBE OIL)	23.4	188.42	12.42
261	FUEL SERVICE SYSTEM	9.4	177.74	11.33
262	MAIN PROPULSION LUBE OIL SYSTEM	10.0	196.74	12.00
264	LUBE OIL FILL, TRANSFER, AND PURIF	4.0	192.74	16.00
290	SPECIAL PURPOSE SYSTEMS	12.0	222.28	9.53
298	OPERATING FLUIDS	9.0	228.00	8.00
299	REPAIR PARTS AND SPECIAL TOOLS	3.0	205.20	14.10

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 15 - ELECTRIC PLANT WEIGHT

SWBS	COMPONENT	WT,LTON	LCG,FT	VCG,FT
300	ELECTRIC PLANT	248.0	199.42	16.82
310	ELECTRIC POWER GENERATION	121.9	195.11	12.01
311	SHIP SERVICE POWER GENERATION	89.8	197.08	12.00
313	BATTERIES AND SERVICE FACILITIES	22.8	197.08	6.00
314	POWER CONVERSION EQUIPMENT	9.2	171.00	27.00
320	POWER DISTRIBUTION SYSTEMS	51.7	204.24	24.76
321	SHIP SERVICE POWER CABLE	32.4	201.40	27.00
324	SWITCHGEAR AND PANELS	19.3	209.00	21.00
330	LIGHTING SYSTEM	18.7	200.00	27.22
331	LIGHTING DISTRIBUTION	11.8	201.40	27.00
332	LIGHTING FIXTURES	6.9	197.60	27.60
340	POWER GENERATION SUPPORT SYSTEMS	37.7	195.27	17.56
342	DIESEL SUPPORT SYSTEMS	37.7	195.27	17.56
343	TURBINE SUPPORT SYSTEMS	0.0	0.00	0.00
390	SPECIAL PURPOSE SYSTEMS	18.0	222.86	14.25

398	OPERATING FLUIDS	13.5	197.08	12.00
399	REPAIR PARTS AND SPECIAL TOOLS	4.5	300.20	21.00

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 16 - MACHINERY ROOMS

NO MAIN MACHINERY ROOMS	2
NO AUX MACHINERY ROOMS	0
NO OTHER MACHINERY ROOMS	0

BULKHEAD LOCATIONS

MR NO	MR ID	FWD BHD BHD NO	FWD BHD X, FT	FWD BHD X/LBP	AFT BHD BHD NO	AFT BHD X, FT	AFT BHD X/LBP
1	MMR1	6.	137.82	0.363	7.	172.65	0.454
2	MMR2	9.	231.17	0.608	10.	266.00	0.700

DIMENSIONS

MR NO	MR ID	LENGTH, FT AVAIL	LENGTH, FT REQ	WIDTH, FT AVAIL	WIDTH, FT REQ	HEIGHT, FT AVAIL	HEIGHT, FT REQ
1	MMR1	34.83	34.83	49.25	21.06	21.25	19.58
2	MMR2	34.83	34.83	51.72	21.06	19.46	19.58

ARRANGEMENTS

MR NO	MR ID	ROTATION ANGLE,DEG
1	MMR1	0.00
2	MMR2	0.00

PRINTED REPORT NO. 17 - MACHINERY ARRANGEMENTS

CLEARANCES (MACHINERY TO MACHINERY)

ENG TO ENG CLR, FT	1.00
ENG TO GEAR CLR, FT OR ENG TO GEN CLR OR GEAR TO GEN CLR	1.00
MTR TO GEAR CLR, FT	2.50
PRPLN ARR TO SS ARR CLR, FT	6.00
AISLE WIDTH CLR, FT	2.50
PORT/CL TB TO GEAR CLR, FT	.00
STBD TB TO GEAR CLR, FT	.00

SEPARATIONS (BETWEEN HULL AND MACHINERY)

LONG (TO BHD), FT	1.00
TRANS (TO SIDE SHELL), FT	1.00
VERT (TO HULL BOT), FT	1.00
RADIAL (TO POD), FT	1.00

ARRANGEMENTS

ARRANGEMENT	TYPE	NO INSTALLED	NO ONLINE MAX+SUSTN	NO ONLINE ENDURANCE
ELECT PG ARR 1 IND	M-PG	2	2	1
ELECT PG ARR 2 IND		0	0	0
ELECT DL ARR IND	MTR	2	2	2
SHIP SERVICE ARR	DIESEL	2	2	1

MACHINERY COMPONENT LOCATIONS

COMPONENT	MR ID	CG LOC, FT X	Y	Z
MAIN ENG	MMR1	148.06	-6.10	15.00
MAIN ENG	MMR2	241.41	-6.10	15.00
SS ENG	MMR1	146.97	6.93	12.00
SS ENG	MMR2	240.32	6.93	12.00
PRPLN MTR		356.30	-8.22	3.44
PRPLN MTR		356.30	8.22	3.44

SHAFTING

SHAFT TYPE	END POINT LOC, FT X	Y	Z	SHAFT ANGLE, DEG
PORT SHAFT	349.72	-8.22	2.77	-5.85
STBD SHAFT	349.72	8.22	2.77	-5.85

PRINTED REPORT NO. 18 - MACHINERY SPACE REQUIREMENTS

MACHINERY ROOM VOLUME REQUIREMENTS

VOLUME CATEGORY	VOLUME, FT3
SWBS GROUP 200	71423.
PROPULSION POWER GENERATION	13512.
PROPULSION ENGINES	8846.
PROPULSION REDUCTION GEARS AND GENERATORS	4666.
DRIVELINE MACHINERY	0.
REDUCTION AND BEVEL GEARS WITH Z-DRIVE	0.
ELECTRIC PROPULSION MOTORS AND GEARS	0.
REMOTELY-LOCATED THRUST BEARINGS	0.
PROPELLER SHAFT	0.
ELECTRIC PROPULSION MISCELLANEOUS EQUIPMENT	9916.
CONTROLS	1489.
BRAKING RESISTORS	771.
MOTOR AND GENERATOR EXCITERS	1489.
SWITCHGEAR	726.
POWER CONVERTERS	669.
DEIONIZED COOLING WATER SYSTEMS	2352.
RECTIFIERS	548.
HELIUM REFRIGERATION SYSTEMS	1872.
PROPULSION AUXILIARIES	47995.
PROPULSION LOCAL CONTROL CONSOLES	3601.
CP PROP HYDRAULIC OIL POWER MODULES	0.
FUEL OIL PUMPS	24465.
LUBE OIL PUMPS	2590.
LUBE OIL PURIFIERS	15269.
ENGINE LUBE OIL CONDITIONERS	599.
SEAWATER COOLING PUMPS	1470.
SWBS GROUP 300	23987.
ELECTRIC PLANT POWER GENERATION	9898.
ELECTRIC PLANT ENGINES	6130.
ELECTRIC PLANT GENERATORS AND GEARS	3768.
SHIP SERVICE SWITCHBOARDS	14089.
CYCLOCONVERTERS	0.
SWBS GROUP 500	40613.
AUXILIARY MACHINERY	40613.
AIR CONDITIONING PLANTS	7395.
AUXILIARY BOILERS	1135.

FIRE PUMPS	2427.
DISTILLING PLANTS	10881.
AIR COMPRESSORS	5895.
ROLL FIN PAIRS	10305.
SEWAGE PLANTS	2576.

ARRANGEABLE AREA REQUIREMENTS

SSCS	GROUP NAME	----FT2---- HULL/DKHS	DKHS ONLY
4.31	AUXILIARY MACHINERY DELTA	8258.6	0.0
4.3311	SHIP SERVICE POWER GENERATION	0.0	0.0
4.132	INTERNAL COMB ENG COMB AIR	0.0	0.0
4.133	INTERNAL COMB ENG EXHAUST	68.0	68.0
4.142	GAS TURBINE ENG COMB AIR	133.0	133.0
4.143	GAS TURBINE ENG EXHAUST	332.4	177.1

NOTE: * DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 19 - SURFACE SHIP ENDURANCE CALCULATION FORM

DESIGN MODE IND-ENDURANCE
ENDUR DISP IND-AVG DISP
ENDUR DEF IND-USN
SHIP FUEL TYPE IND-JP-5

ENG ENDUR RPM IND-CALC

SHIP FUEL LHV, BTU/LBM 18300.
DFM FUEL LHV, BTU/LBM 18360.

(1)	ENDURANCE REQUIRED, NM	8000.
(2)	ENDURANCE SPEED, KT	14.00
(3)	FULL LOAD DISPLACEMENT, LTON	3813.4
(3A)	AVERAGE ENDURANCE DISPLACEMENT, LTON	3591.0
(4)	RATED FULL POWER SHP, HP	27273.
(5)	DESIGN ENDURANCE POWER SHP @ (2)&(3A), HP	3227.
(6)	AVERAGE ENDURANCE POWER (SHP), HP (5) X 1.10	3550.
(7)	RATIO, AVG END SHP/RATED F.P. SHP (6)/(4)	0.13015
(8)	AVERAGE ENDURANCE BHP, HP (8A)+(8B)	3891.
(8A)	AVERAGE PRPLN ENDURANCE BHP, HP (6)/TRANSMISSION EFFICIENCY	3891.
(8B)	SHIP SERV PWR SUPPLIED BY PRPLN ENG, HP	0.
(9)	24 HOUR AVERAGE ELECTRIC LOAD, KW	1075.
(9A)	24 HOUR AVERAGE ELECTRIC LOAD PORTION SUPPLIED BY SS ENG, KW	1075.
(10)	CALCULATED PROPULSION FUEL RATE @(8), LBM/HP-HR	0.342
(11)	CALC PRPLN FUEL CONSUMPTION, LBM/HR (10)X(8)	1332.1
(12)	CALC SS GEN FUEL RATE @ (9A), LBM/KW-HR	0.482
(13)	CALC SS GEN FUEL CONSUMPTION, LBM/HR (12)X(9A)	518.0
(14)	CALC FUEL CONSUMPTION FOR OTHER SERVICES, LBM/HR	0.0
(15)	TOTAL CALC ALL-PURPOSE FUEL CONSUMPTION, LBM/HR (11)+(13)+14)	1850.1
(16)	CALC ALL-PURPOSE FUEL RATE, LBM/HP-HR (15)/(6)	0.521
(17)	FUEL RATE CORRECTION FACTOR BASED ON (7)	1.0400
(18)	SPECIFIED FUEL RATE, LBM/HP-HR (16)X(17)	0.542

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(19) AVG ENDURANCE FUEL RATE, LBM/HP-HR                        0.569
     (18)X1.05
(20) ENDURANCE FUEL (BURNABLE), LTON                          517.1 *
     (1)X(6)X(19)/(2)X2240
(21) TAILPIPE ALLOWANCE FACTOR                                 0.95
(22) ENDURANCE FUEL LOAD, LTON                                544.3
     (20)/(21)

ENG ENDUR RPM IND-       pk?

PRINTED REPORT NO. 20 - MACHINERY MARGINS

PROPULSION PLANT
----------------
MAIN ENG MAX LOAD FRAC       1.000
SEC ENG MAX LOAD FRAC
TORQUE MARGIN FAC            1.200

ELECTRIC PLANT
--------------
SS ENG MAX LOAD FRAC         1.000
ELECT LOAD DES MARGIN FAC    0.200
ELECT LOAD SL MARGIN FAC     0.100
ELECT LOAD IMBAL FAC         0.900
C,E>RUN,AUX
COMMAND STRING IS:
  RUN,AUXILIARY SYS MODULE

 ASSET/MONOSC VERSION 3.3+ - AUXILIARY SYS MODULE - 2/11/95  11.18.11.

PRINTED REPORT NO. 1 - SUMMARY

LBP,FT                          380.0    TOTAL ACCOM                    122.0
BEAM,FT                          51.0    COLL PROT SYS IND            PRESENT
TOTAL AREA,FT2                  39839.   COMP HTR TYPE IND           ELECTRIC
TOTAL VOLUME,FT3               491932.   DISTILLER TYPE IND        RE OSMOSIS
USABLE FUEL WT,LTON             517.1    WATER HTR TYPE IND           INSTANT
FULL LOAD WT,LTON              3813.4    ANCHOR LOC IND                BOTTOM
MAX SHP, HP                    30217.    PRAIRIE SYS IND              PRESENT
                                         MASKER SYS IND               PRESENT
SEP GEN:     5475.0 KW

TOTAL AIRCOND LOAD, TON         164.6    TOTAL STEAM LOAD, LB/HR         110.
NO AIRCOND UNITS                  3.0    AUX BOILER TYPE IND         ELECTRIC
TOTAL AIRCOND CAP, TON          255.0    NO AUX BOILERS                    2.
SWBS 514 WT,LTON                 55.7    TOTAL AUX BLR CAP, LB/HR        200.
                                         SWBS 517 WT,LTON                 0.3
BOAT SELECT IND                 GIVEN
BOAT TYPE IND                   MIXED
BOAT COMPLEMENT      2 RIB+UB/UB         NO FAS STATIONS                   2.
SWBS 583 WT,LTON                 35.6    RAS STATIONS:      NO           TYPE
                                                            2.
BULKHEAD

                                         SSCS 3.53 AREA,FT2             212.9
STRIKE GEAR:       NO             TYPE   SWBS 571 WT,LTON                10.7
                   2.           PALLET

STRK DECK AREA,FT2              472.2    STOWAGE AREA,FT2            2299.7
SWBS 572 WT,LTON                 35.1    SWBS 671 WT,LTON               4.0
                                         SWBS 672 WT,LTON              25.3
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PRINTED REPORT NO. 2- AIRCONDITIONING

AIRCOND MARGIN	0.20	TOTAL ACCOM	122.0
SHIP AIRCOND LOAD, TON	137.1	COLL PROT SYS IND	PRESENT
AIRCOND MARGIN LOAD, TON	27.4		
TOTAL AIRCOND LOAD, TON	164.6	SWBS 514 WT,LTON	55.7
AIRCOND UNIT CAP, TON	85.0	SWBS 514 VCG,FT	17.1
NO AIRCOND UNITS	3.0		
TOTAL AIRCOND CAP, TON	255.0		

PRINTED REPORT NO. 3- AUXILIARY BOILERS

AUX BOILER TYPE IND	ELECTRIC	TOTAL ACCOM	122.0
NO AUX BOILERS	2.	COLL PROT SYS IND	PRESENT
AUX BLR UNIT CAP, LB/HR	100.	COMP HTR TYPE IND	ELECTRIC
TOTAL AUX BLR CAP, LB/HR	200.	DISTILLER TYPE IND	RE OSMOSIS
SWBS 261 STEAM LOAD	818.	SWBS 517 WT,LTON	55.7
SWBS 264 STEAM LOAD	30.	SWBS 517 VCG,FT	17.1
SWBS 511 STEAM LOAD	0.		
SWBS 517 STEAM LOAD	134.		
SWBS 531 STEAM LOAD	0.		
SWBS 533 STEAM LOAD	933.		
SWBS 541 STEAM LOAD	573.		
SWBS 651 STEAM LOAD	49.		
SWBS 655 STEAM LOAD	61.		

TOTAL STEAM LOAD, LB/HR	110.		

PRINTED REPORT NO. 4- BOATS

BOAT SELECT IND	GIVEN	BOAT COMP WT,LTON	33.7
BOAT TYPE IND	MIXED		
BOAT COMPLEMENT	2 RIB+UB/UB	SWBS 583 WT,LTON	35.6
		SWBS 583 VCG,FT	39.0

PRINTED REPORT NO. 5- REPLENISHMENT SYSTEMS

NO FAS STATIONS	2.
FAS STATION WT,LTON	0.5

RAS STATIONS:	NO	TYPE
	2.	BULKHEAD

RAS STATION WT,LTON	10.2	DKHS ONLY AREA,FT2	212.9
RAS STATION VCG,FT	37.0	SSCS 3.53 AREA,FT2	212.9
SWBS 571 WT,LTON	10.7		
SWBS 571 VCG,FT	36.8		

PRINTED REPORT NO. 6- STRIKE GEAR

STRIKE GEAR:	NO	TYPE
	2.	PALLET

STRK DECK AREA,FT2	472.2
SWBS 572 WT,LTON	35.1
SWBS 572 VCG,FT	23.9

PRINTED REPORT NO. 7- STOWAGE SYSTEMS

STOWAGE SSCS SPACES AND ASSOCIATED FACTORS

SSCS SPACES	STOW UTIL FACTOR	STOW EFF FACTOR	DECK LOAD LB/FT2	STACK HEIGHT,FT
A1390	0.36	0.45	25.00	6.50
A2230	1.00	0.50	3.70	6.50

A2410	0.67	0.47	14.70	6.50
A2620	0.58	0.45	14.70	6.50
A3700	0.54	0.45	32.10	6.50

STOWAGE AREA,FT2	2299.7
SWBS 671 WT,LTON	4.0
SWBS 671 VCG,FT	22.3
SWBS 672 WT,LTON	25.3
SWBS 672 VCG,FT	14.1

PRINTED REPORT NO. 8 - AUXILIARY SYSTEMS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
*500	AUXILIARY SYSTEMS, GENERAL	516.9	20.39
510	CLIMATE CONTROL	114.3	23.01
511	COMPARTMENT HEATING SYSTEM	4.4	25.65
512	VENTILATION SYSTEM	43.4	28.77
513	MACHINERY SPACE VENT SYSTEM	8.7	32.71
514	AIR CONDITIONING SYSTEM	55.7	17.12
516	REFRIGERATION SYSTEM	1.9	14.86
517	AUX BOILERS+OTHER HEAT SOURCES	.3	17.51
520	SEA WATER SYSTEMS	39.9	19.58
521	FIREMAIN+SEA WATER FLUSHING SYS	20.5	18.75
522	SPRINKLING SYSTEM		21.67
523	WASHDOWN SYSTEM	3.0	34.23
524	AUXILIARY SEAWATER SYSTEM		
526	SCUPPERS+DECK DRAINS	.8	31.63
527	FIREMAIN ACTUATED SERV, OTHER		
528	PLUMBING DRAINAGE	12.0	19.50
529	DRAINAGE+BALLASTING SYSTEM	3.6	9.90
530	FRESH WATER SYSTEMS	23.6	17.07
531	DISTILLING PLANT	3.8	15.91
* 532	COOLING WATER	4.0	25.73
533	POTABLE WATER	5.9	19.56
534	AUX STEAM + DRAINS IN MACH BOX	9.8	12.49
535	AUX STEAM + DRAINS OUT MACH BOX		
536	AUXILIARY FRESH WATER COOLING		
540	FUELS/LUBRICANTS,HANDLING+STORAGE	31.1	12.53
541	SHIP FUEL+COMPENSATING SYSTEM	29.8	12.91
542	AVIATION+GENERAL PURPOSE FUELS		
543	AVIATION+GENERAL PURPOSE LUBO		
544	LIQUID CARGO		
545	TANK HEATING	1.3	3.90
549	SPEC FUEL+LUBRICANTS HANDL+STOW		
550	AIR,GAS+MISC FLUID SYSTEM	43.0	18.56
551	COMPRESSED AIR SYSTEMS	19.8	16.51
552	COMPRESSED GASES		
553	O2 N2 SYSTEM		
554	LP BLOW		
555	FIRE EXTINGUISHING SYSTEMS	23.2	20.32
556	HYDRAULIC FLUID SYSTEM		
557	LIQUID GASES, CARGO		
558	SPECIAL PIPING SYSTEMS		
560	SHIP CNTL SYS	76.8	5.66
561	STEERING+DIVING CNTL SYS	11.8	17.45
562	RUDDER	27.6	7.04
565	TRIM+HEEL SYSTEMS	37.4	.90
568	MANEUVERING SYSTEMS		
570	UNDERWAY REPLENISHMENT SYSTEMS	45.8	26.90
571	REPLENISHMENT-AT-SEA SYSTEMS	10.7	36.82
572	SHIP STORES+EQUIP HANDLING SYS	35.1	23.88
573	CARGO HANDLING SYSTEMS		
574	VERTICAL REPLENISHMENT SYSTEMS		
580	MECHANICAL HANDLING SYSTEMS	74.5	30.98

	581	ANCHOR HANDLING+STOWAGE SYSTEMS	23.9	18.78
	582	MOORING+TOWING SYSTEMS	10.1	30.76
	583	BOATS,HANDLING+STOWAGE SYSTEMS	35.6	39.00
	584	MECH OPER DOOR,GATE,RAMP,TTBL SYS		
	585	ELEVATING + RETRACTING GEAR		
	586	AIRCRAFT RECOVERY SUPPORT SYS		
	587	AIRCRAFT LAUNCH SUPPORT SYSTEM		
*	588	AIRCRAFT HANDLING,SERVICING,STOWAGE	5.0	32.76
	589	MISC MECH HANDLING SYSTEMS		
	590	SPECIAL PURPOSE SYSTEMS	47.9	17.30
	591	SCIENTIFIC+OCEAN ENGINEERING SYS		
	592	SWIMMER+DIVER SUPPORT+PROT SYS		
	593	ENVIRONMENTAL POLLUTION CNTL SYS	9.7	11.44
	594	SUBMARINE RESC+SALVG+SURVIVE SYS		
	595	TOW,LAUNCH,HANDLE UNDERWATER SYS		
	596	HANDLING SYS FOR DIVER+SUBMR VEH		
	597	SALVAGE SUPPORT SYSTEMS		
	598	AUX SYSTEMS OPERATING FLUIDS	32.8	19.26
	599	AUX SYSTEMS REPAIR PARTS+TOOLS	5.5	15.90

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

OUTFIT+FURNISHINGS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
671	LOCKERS+SPECIAL STOWAGE	4.0	22.29
672	STOREROOMS+ISSUE ROOMS	25.3	14.15

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

C,E>RUN,WEIGH
COMMAND STRING IS:
RUN,WEIGHT MODULE

ASSET/MONOSC VERSION 3.3+ - WEIGHT MODULE - 2/11/95 11.18.28.

PRINTED REPORT NO. 1 - SUMMARY

SWBS	GROUP	WEIGHT LTON	WEIGHT PER CENT	LCG FT	VCG FT	RESULTANT ADJ WT-LTON	RESULTANT ADJ VCG-FT
100	HULL STRUCTURE	1289.7	33.8	186.46	21.40	1.0	.00
200	PROP PLANT	272.3	7.1	247.04	13.40		
300	ELECT PLANT	248.0	6.5	199.42	16.82		
400	COMM + SURVEIL	129.8	3.4	144.40	25.23	83.4	.53
500	AUX SYSTEMS	516.9	13.6	209.00	20.39	20.0	.19
600	OUTFIT + FURN	307.2	8.1	190.00	20.62		
700	ARMAMENT	20.6	0.5	171.00	33.68	16.2	.15
M11	D+B WT MARGIN	347.9	9.1	196.04	20.21		
	D+B KG MARGIN			+	2.53		
	LIGHTSHIP	3132.4	82.1	196.04	22.73	120.6	.88
F00	FULL LOADS	680.8	17.9	194.16	4.72	85.0	.22
F10	CREW + EFFECTS	13.0		178.60	22.98		
F20	MISS REL EXPEN	21.2		167.20	10.40		
F30	SHIPS STORES	17.4		205.20	17.23		
F40	FUELS + LUBRIC	611.1		195.44	3.79		
F50	FRESH WATER	18.1			4.33		
F60	CARGO						
M24	FUTURE GROWTH						
	FULL LOAD WT	3813.2	100.0	195.70	19.52	205.6	1.10

PRINTED REPORT NO. 2 - HULL STRUCTURES WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
100	HULL STRUCTURES	1289.7	21.40
110	SHELL + SUPPORTS	379.2	13.48
111	PLATING	218.4	18.76
113	INNER BOTTOM	36.4	4.50
114	SHELL APPENDAGES	17.1	3.67
115	STANCHIONS	5.1	15.00
116	LONGIT FRAMING	64.2	1.49
117	TRANSV FRAMING	38.0	16.26
120	HULL STRUCTURAL BULKHDS	78.0	18.79
121	LONGIT STRUCTURAL BULKHDS		
122	TRANSV STRUCTURAL BULKHDS	66.6	18.79
123	TRUNKS + ENCLOSURES	11.3	18.79
124	BULKHEADS, TORPEDO PROTECT SYS		
130	HULL DECKS	260.9	26.76
131	MAIN DECK	153.3	31.05
132	2ND DECK	107.6	20.66
133	3RD DECK		
134	4TH DECK		
135	5TH DECK+DECKS BELOW		
136	01 HULL DECK		
137	02 HULL DECK		
138	03 HULL DECK		
139	04 HULL DECK		
140	HULL PLATFORMS/FLATS	58.5	12.22
141	1ST PLATFORM	58.5	12.22
142	2ND PLATFORM		
143	3RD PLATFORM		
144	4TH PLATFORM		
145	5TH PLAT+PLATS BELOW		
149	FLATS		
150	DECK HOUSE STRUCTURE	201.0	36.41
160	SPECIAL STRUCTURES	59.3	16.12
161	CASTINGS+FORGINGS+EQUIV WELDMT	31.4	9.30
162	STACKS AND MACKS	2.1	46.37
163	SEA CHESTS	3.1	3.70
164	BALLISTIC PLATING		
165	SONAR DOMES		
166	SPONSONS		
167	HULL STRUCTURAL CLOSURES	17.9	21.97
168	DKHS STRUCTURAL CLOSURES	.8	38.03
169	SPECIAL PURPOSE CLOSURES+STRUCT	4.1	33.05
170	MASTS+KINGPOSTS+SERV PLATFORM	31.6	79.40
171	MASTS,TOWERS,TETRAPODS	31.6	79.40
172	KINGPOSTS AND SUPPORT FRAMES		
179	SERVICE PLATFORMS		
180	FOUNDATIONS	207.5	11.98
181	HULL STRUCTURE FOUNDATIONS		
182	PROPULSION PLANT FOUNDATIONS	90.3	7.47
183	ELECTRIC PLANT FOUNDATIONS	43.8	12.82
184	COMMAND+SURVEILLANCE FDNS	10.7	23.46
185	AUXILIARY SYSTEMS FOUNDATIONS	51.7	15.22
186	OUTFIT+FURNISHINGS FOUNDATIONS	9.5	17.97
187	ARMAMENT FOUNDATIONS	1.5	27.32
190	SPECIAL PURPOSE SYSTEMS	13.8	3.78
* 191	BALLAST+BOUYANCY UNITS	1.0	1.00
197	WELDING AND RIVETS		
198	FREE FLOODING LIQUIDS	12.8	4.00

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 3 - PROPULSION PLANT WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
200	PROPULSION PLANT	272.3	13.40
210	ENERGY GEN SYS (NUCLEAR)		
220	ENERGY GENERATING SYSTEM (NONNUC)		
221	PROPULSION BOILERS		
222	GAS GENERATORS		
223	MAIN PROPULSION BATTERIES		
224	MAIN PROPULSION FUEL CELLS		
230	PROPULSION UNITS	181.3	12.17
231	STEAM TURBINES		
232	STEAM ENGINES		
233	DIESEL ENGINES		
234	GAS TURBINES	58.2	17.33
235	ELECTRIC PROPULSION	123.1	9.73
236	SELF-CONTAINED PROPULSION SYS		
237	AUXILIARY PROPULSION DEVICES		
240	TRANSMISSION+PROPULSOR SYSTEMS	20.6	2.52
241	REDUCTION GEARS		
242	CLUTCHES + COUPLINGS		
243	SHAFTING	1.4	2.62
244	SHAFT BEARINGS	5.9	2.88
245	PROPULSORS	13.3	2.35
246	PROPULSOR SHROUDS AND DUCTS		
247	WATER JET PROPULSORS		
250	SUPPORT SYSTEMS	35.0	28.20
251	COMBUSTION AIR SYSTEM	10.0	27.25
252	PROPULSION CONTROL SYSTEM	8.9	19.50
253	MAIN STEAM PIPING SYSTEM		
254	CONDENSERS AND AIR EJECTORS		
255	FEED AND CONDENSATE SYSTEM		
256	CIRC + COOL SEA WATER SYSTEM	2.4	10.80
258	H.P. STEAM DRAIN SYSTEM		
259	UPTAKES (INNER CASING)	13.6	37.76
260	PROPUL SUP SYS- FUEL, LUBE OIL	23.4	12.42
261	FUEL SERVICE SYSTEM	9.4	11.33
262	MAIN PROPULSION LUBE OIL SYSTEM	10.0	12.00
264	LUBE OIL HANDLING	4.0	16.00
290	SPECIAL PURPOSE SYSTEMS	12.0	9.53
298	OPERATING FLUIDS	9.0	8.00
299	REPAIR PARTS + TOOLS	3.0	14.10

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 4 - ELECTRIC PLANT WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
300	ELECTRIC PLANT, GENERAL	248.0	16.82
310	ELECTRIC POWER GENERATION	121.9	12.01
311	SHIP SERVICE POWER GENERATION	89.8	12.00
312	EMERGENCY GENERATORS		
313	BATTERIES+SERVICE FACILITIES	22.8	6.00
314	POWER CONVERSION EQUIPMENT	9.2	27.00
320	POWER DISTRIBUTION SYS	51.7	24.76
321	SHIP SERVICE POWER CABLE	32.4	27.00
322	EMERGENCY POWER CABLE SYS		
323	CASUALTY POWER CABLE SYS		
324	SWITCHGEAR+PANELS	19.3	21.00
330	LIGHTING SYSTEM	18.7	27.22
331	LIGHTING DISTRIBUTION	11.8	27.00
332	LIGHTING FIXTURES	6.9	27.60
340	POWER GENERATION SUPPORT SYS	37.7	17.56

341	SSTG LUBE OIL		
342	DIESEL SUPPORT SYS	37.7	17.56
343	TURBINE SUPPORT SYS		
390	SPECIAL PURPOSE SYS	18.0	14.25
398	ELECTRIC PLANT OP FLUIDS	13.5	12.00
399	REPAIR PARTS+SPECIAL TOOLS	4.5	21.00

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 5 - COMMAND+SURVEILLANCE WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
400	COMMAND+SURVEILLANCE	129.8	25.23
* 410	COMMAND+CONTROL SYS	37.0	1.47
411	DATA DISPLAY GROUP		
412	DATA PROCESSING GROUP		
413	DIGITAL DATA SWITCHBOARDS		
414	INTERFACE EQUIPMENT		
415	DIGITAL DATA COMMUNICATIONS		
417	COMMAND+CONTROL ANALOG SWBD		
* 420	NAVIGATION SYS	3.8	44.83
430	INTERIOR COMMUNICATIONS	18.5	25.42
* 440	EXTERIOR COMMUNICATIONS	16.0	21.80
441	RADIO SYSTEMS		
442	UNDERWATER SYSTEMS		
443	VISUAL + AUDIBLE SYSTEMS		
444	TELEMETRY SYSTEMS		
445	TTY + FACSIMILE SYSTEMS		
446	SECURITY EQUIPMENT SYSTEMS		
450	SURF SURV SYS (RADAR)	22.0	61.59
* 451	SURFACE SEARCH RADAR	1.8	59.50
452	AIR SEARCH RADAR (2D)		
453	AIR SEARCH RADAR (3D)		
454	AIRCRAFT CONTROL APPROACH RADAR		
* 455	IDENTIFICATION SYSTEMS (IFF)	2.3	60.00
* 456	MULTIPLE MODE RADAR	18.0	62.00
459	SPACE VEHICLE ELECTRONIC TRACKG		
460	UNDERWATER SURVEILLANCE SYSTEMS		
461	ACTIVE SONAR		
462	PASSIVE SONAR		
463	MULTIPLE MODE SONAR		
464	CLASSIFICATION SONAR		
465	BATHYTHERMOGRAPH		
466	LAMPS ELECTRONICS		
470	COUNTERMEASURES	22.3	25.57
471	ACTIVE + ACTIVE/PASSIVE ECM		
* 472	PASSIVE ECM	3.0	51.00
* 473	TORPEDO DECOYS	3.6	22.76
474	DECOYS (OTHER)		
475	DEGAUSSING	15.7	21.34
476	MINE COUNTERMEASURES		
480	FIRE CONTROL SYS		
481	GUN FIRE CONTROL SYSTEMS		
482	MISSILE FIRE CONTROL SYSTEMS		
483	UNDERWATER FIRE CONTROL SYSTEMS		
484	INTEGRATED FIRE CONTROL SYSTEMS		
489	WEAPON SYSTEM SWITCHBOARDS		
490	SPECIAL PURPOSE SYS	10.3	29.70
* 491	ELCTRNC TEST,CHKOUT,MONITR EQPT	6.0	33.61
492	FLIGHT CNTRL+INSTR LANDING SYS		
493	NON-COMBAT DATA PROCESSING SYS	2.3	21.67
494	METEOROLOGICAL SYSTEMS		
495	SPEC PURPOSE INTELLIGENCE SYS		
498	C+S OPERATING FLUIDS		
499	REPAIR PARTS+SPECIAL TOOLS	1.9	26.9

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 6 - AUXILIARY SYSTEMS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
*500	AUXILIARY SYSTEMS, GENERAL	516.9	20.39
510	CLIMATE CONTROL	114.3	23.01
511	COMPARTMENT HEATING SYSTEM	4.4	25.65
512	VENTILATION SYSTEM	43.4	28.77
513	MACHINERY SPACE VENT SYSTEM	8.7	32.71
514	AIR CONDITIONING SYSTEM	55.7	17.12
516	REFRIGERATION SYSTEM	1.9	14.86
517	AUX BOILERS+OTHER HEAT SOURCES	.3	17.51
520	SEA WATER SYSTEMS	39.9	19.58
521	FIREMAIN+SEA WATER FLUSHING SYS	20.5	18.75
522	SPRINKLING SYSTEM		21.67
523	WASHDOWN SYSTEM	3.0	34.23
524	AUXILIARY SEAWATER SYSTEM		
526	SCUPPERS+DECK DRAINS	.8	31.63
527	FIREMAIN ACTUATED SERV, OTHER		
528	PLUMBING DRAINAGE	12.0	19.50
529	DRAINAGE+BALLASTING SYSTEM	3.6	9.90
530	FRESH WATER SYSTEMS	23.6	17.07
531	DISTILLING PLANT	3.8	15.91
* 532	COOLING WATER	4.0	25.73
533	POTABLE WATER	5.9	19.56
534	AUX STEAM + DRAINS IN MACH BOX	9.8	12.49
535	AUX STEAM + DRAINS OUT MACH BOX		
536	AUXILIARY FRESH WATER COOLING		
540	FUELS/LUBRICANTS,HANDLING+STORAGE	31.1	12.53
541	SHIP FUEL+COMPENSATING SYSTEM	29.8	12.91
542	AVIATION+GENERAL PURPOSE FUELS		
543	AVIATION+GENERAL PURPOSE LUBO		
544	LIQUID CARGO		
545	TANK HEATING	1.3	3.90
549	SPEC FUEL+LUBRICANTS HANDL+STOW		
550	AIR,GAS+MISC FLUID SYSTEM	43.0	18.56
551	COMPRESSED AIR SYSTEMS	19.8	16.51
552	COMPRESSED GASES		
553	O2 N2 SYSTEM		
554	LP BLOW		
555	FIRE EXTINGUISHING SYSTEMS	23.2	20.32
556	HYDRAULIC FLUID SYSTEM		
557	LIQUID GASES, CARGO		
558	SPECIAL PIPING SYSTEMS		
560	SHIP CNTL SYS	76.8	5.66
561	STEERING+DIVING CNTL SYS	11.8	17.45
562	RUDDER	27.6	7.04
565	TRIM+HEEL SYSTEMS	37.4	.90
568	MANEUVERING SYSTEMS		
570	UNDERWAY REPLENISHMENT SYSTEMS	45.8	26.90
571	REPLENISHMENT-AT-SEA SYSTEMS	10.7	36.82
572	SHIP STORES+EQUIP HANDLING SYS	35.1	23.88
573	CARGO HANDLING SYSTEMS		
574	VERTICAL REPLENISHMENT SYSTEMS		
580	MECHANICAL HANDLING SYSTEMS	74.5	30.98
581	ANCHOR HANDLING+STOWAGE SYSTEMS	23.9	18.78
582	MOORING+TOWING SYSTEMS	10.1	30.76
583	BOATS,HANDLING+STOWAGE SYSTEMS	35.6	39.00
584	MECH OPER DOOR,GATE,RAMP,TTBL SYS		
585	ELEVATING + RETRACTING GEAR		
586	AIRCRAFT RECOVERY SUPPORT SYS		
587	AIRCRAFT LAUNCH SUPPORT SYSTEM		
* 588	AIRCRAFT HANDLING,SERVICING,STOWAGE	5.0	32.76
589	MISC MECH HANDLING SYSTEMS		

590	SPECIAL PURPOSE SYSTEMS	47.9	17.30
591	SCIENTIFIC+OCEAN ENGINEERING SYS		
592	SWIMMER+DIVER SUPPORT+PROT SYS		
593	ENVIRONMENTAL POLLUTION CNTL SYS	9.7	11.44
594	SUBMARINE RESC+SALVG+SURVIVE SYS		
595	TOW,LAUNCH,HANDLE UNDERWATER SYS		
596	HANDLING SYS FOR DIVER+SUBMR VEH		
597	SALVAGE SUPPORT SYSTEMS		
598	AUX SYSTEMS OPERATING FLUIDS	32.8	19.26
599	AUX SYSTEMS REPAIR PARTS+TOOLS	5.5	15.90

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 7 - OUTFIT+FURNISHINGS WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
600	OUTFIT+FURNISHING,GENERAL	307.2	20.62
610	SHIP FITTINGS	8.8	35.41
611	HULL FITTINGS	1.8	27.95
612	RAILS,STANCHIONS+LIFELINES	6.2	36.41
613	RIGGING+CANVAS	.8	43.70
620	HULL COMPARTMENTATION	71.3	19.04
621	NON-STRUCTURAL BULKHEADS	19.1	27.15
622	FLOOR PLATES+GRATING	38.1	12.73
623	LADDERS	9.2	22.10
624	NON-STRUCTURAL CLOSURES	3.9	26.99
625	AIRPORTS,FIXED PORTLIGHTS,WINDOWS	1.0	44.00
630	PRESERVATIVES+COVERINGS	126.6	20.70
631	PAINTING	30.7	17.12
632	ZINC COATING		
633	CATHODIC PROTECTION	2.1	7.00
634	DECK COVERINGS	26.6	23.51
635	HULL INSULATION	41.0	26.43
636	HULL DAMPING	13.2	4.03
637	SHEATHING	8.1	28.60
638	REFRIGERATION SPACES	4.9	17.55
639	RADIATION SHIELDING		
640	LIVING SPACES	24.7	21.63
641	OFFICER BERTHING+MESSING	6.8	30.33
642	NON-COMM OFFICER B+M	3.0	22.97
643	ENLISTED PERSONNEL B+M	12.1	16.47
644	SANITARY SPACES+FIXTURES	1.5	22.10
645	LEISURE+COMMUNITY SPACES	1.2	19.93
650	SERVICE SPACES	9.9	21.99
651	COMMISSARY SPACES	4.9	22.10
652	MEDICAL SPACES	1.3	24.92
653	DENTAL SPACES		
654	UTILITY SPACES	1.2	25.13
655	LAUNDRY SPACES	2.2	18.20
656	TRASH DISPOSAL SPACES	.4	22.97
660	WORKING SPACES	33.3	23.51
661	OFFICES	10.2	23.62
662	MACH CNTL CENTER FURNISHING	.7	13.76
663	ELECT CNTL CENTER FURNISHING	5.1	29.25
664	DAMAGE CNTL STATIONS	7.9	24.05
665	WORKSHOPS,LABS,TEST AREAS	9.4	20.58
670	STOWAGE SPACES	29.3	15.25
671	LOCKERS+SPECIAL STOWAGE	4.0	22.29
672	STOREROOMS+ISSUE ROOMS	25.3	14.15
673	CARGO STOWAGE		
690	SPECIAL PURPOSE SYSTEMS	3.2	18.81
698	OPERATING FLUIDS	.2	20.12
699	REPAIR PARTS+SPECIAL TOOLS	3.0	18.74

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 8 - ARMAMENT WEIGHT

SWBS	COMPONENT	WT-LTON	VCG-FT
700	ARMAMENT	20.6	33.68
* 710	GUNS+AMMUNITION	12.2	33.52
711	GUNS		
712	AMMUNITION HANDLING		
713	AMMUNITION STOWAGE		
* 720	MISSLES+ROCKETS	4.0	44.00
721	LAUNCHING DEVICES		
722	MISSILE,ROCKET,GUID CAP HANDL SYS		
723	MISSILE+ROCKET STOWAGE		
724	MISSILE HYDRAULICS		
725	MISSILE GAS		
726	MISSILE COMPENSATING		
727	MISSILE LAUNCHER CONTROL		
728	MISSILE HEAT,COOL,TEMP CNTRL		
729	MISSILE MONITOR,TEST,ALINEMENT		
730	MINES		
731	MINE LAUNCHING DEVICES		
732	MINE HANDLING		
733	MINE STOWAGE		
740	DEPTH CHARGES		
741	DEPTH CHARGE LAUNCHING DEVICES		
742	DEPTH CHARGE HANDLING		
743	DEPTH CHARGE STOWAGE		
750	TORPEDOES		
751	TORPEDO TUBES		
752	TORPEDO HANDLING		
753	TORPEDO STOWAGE		
760	SMALL ARMS+PYROTECHNICS	1.7	27.30
761	SMALL ARMS+PYRO LAUNCHING DEV	1.0	27.30
762	SMALL ARMS+PYRO HANDLING		
763	SMALL ARMS+PYRO STOWAGE	.7	27.30
770	CARGO MUNITIONS		
772	CARGO MUNITIONS HANDLING		
773	CARGO MUNITIONS STOWAGE		
780	AIRCRAFT RELATED WEAPONS		
782	AIRCRAFT RELATED WEAPONS HANDL		
783	AIRCRAFT RELATED WEAPONS STOW		
790	SPECIAL PURPOSE SYSTEMS	2.7	23.02
791	SPECIAL WEAPONS		
792	SPECIAL WEAPONS HANDLING		
793	SPECIAL WEAPONS STOWAGE		
797	MISC ORDINANCE SPACES		
798	ARMAMENT OPERATING FLUIDS	.2	36.66
799	ARMAMENT REPAIR PART+TOOLS	2.4	21.86

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 9 - LOADS WEIGHT (FULL LOAD CONDITION)

SWBS	COMPONENT	WT-LTON	VCG-FT
F00	LOADS	680.8	4.72
F10	SHIPS FORCE	13.0	22.98
F11	OFFICERS	2.7	22.98
F12	NON-COMMISSIONED OFFICERS	1.9	22.98
F13	ENLISTED MEN	8.4	22.98
F14	MARINES		
F15	TROOPS		
F16	AIR WING PERSONNEL		
F19	OTHER PERSONNEL		

	F20	MISSION RELATED EXPENDABLES+SYS	21.2	10.40
*	F21	SHIP AMMUNITION	14.8	8.85
	F22	ORD DEL SYS AMMO		
*	F23	ORD DEL SYS (AIRCRAFT)	4.4	5.00
	F24	ORD REPAIR PARTS (SHIP)		
	F25	ORD REPAIR PARTS (ORD)		
*	F26	ORD DEL SYS SUPPORT EQUIP	2.0	33.76
	F29	SPECIAL MISSION RELATED SYS		
	F30	STORES	17.4	17.23
	F31	PROVISIONS+PERSONNEL STORES	14.2	16.82
	F32	GENERAL STORES	3.2	19.05
	F33	MARINES STORES (SHIPS COMPLEM)		
	F39	SPECIAL STORES		
	F40	LIQUIDS, PETROLEUM BASED	611.1	3.79
	F41	DIESEL FUEL MARINE	544.3	3.10
*	F42	JP-5	63.8	9.84
	F43	GASOLINE		
	F44	DISTILLATE FUEL		
	F45	NAVY STANDARD FUEL OIL (NSFO)		
	F46	LUBRICATING OIL	3.0	
	F49	SPECIAL FUELS AND LUBRICANTS		
	F50	LIQUIDS, NON-PETRO BASED	18.1	4.33
	F51	SEA WATER		
	F52	FRESH WATER	18.1	4.33
	F53	RESERVE FEED WATER		
	F54	HYDRAULIC FLUID		
	F55	SANITARY TANK LIQUID		
	F56	GAS (NON FUEL TYPE)		
	F59	MISC LIQUIDS, NON-PETROLEUM		
	F60	CARGO		
	F61	CARGO, ORDINANCE + DELIVERY SYS		
	F62	CARGO, STORES		
	F63	CARGO, FUELS + LUBRICANTS		
	F64	CARGO, LIQUIDS, NON-PETROLEUM		
	F65	CARGO, CRYOGENIC+LIQUEFIED GAS		
	F66	CARGO, AMPHIBIOUS ASSAULT SYS		
	F67	CARGO, GASES		
	F69	CARGO, MISCELLANEOUS		
	M24	FUTURE GROWTH MARGIN		

* DENOTES INCLUSION OF PAYLOAD OR ADJUSTMENTS

PRINTED REPORT NO. 10 - WEIGHT AND KG MODIFICATION SUMMARY

ROW	P+A NAME / WT KEYS	ORIGINAL WT, LTON	WT CHNG, LTON	RESULTNT WT, LTON	ORIGINAL KG, FT	KG CHNG, FT	RESULTNT KG, FT
15	BALLIST						
	W191	0.0	1.0	1.0	UNKNOWN	1.0	1.0
1	CIC COMMAND AND DECISION MODFIG						
	W410	0.0	7.0		UNKNOWN	-7.2	
11	CS HOLD UP BATTERY						
			30.0	37.0		3.5	1.5
3	NAV SYS (1/2 DDG 51)						
	W420	UNKNOWN	UNKNOWN	3.8	UNKNOWN	46.0	44.8
2	EXCOMM (1/2 DDG51)						
	W440	0.0	16.0	16.0	UNKNOWN	21.8	21.8
4	SPS-67 SSR						
	W451	0.0	1.8	1.8	UNKNOWN	59.5	59.5
6	MK XII AIMS IFF						
	W455	0.0	2.3	2.3	UNKNOWN	60.0	60.0
5	SPY-3C (MINI-SPY)						
	W456	0.0	18.0	18.0	UNKNOWN	62.0	62.0

9	SLQ-32(V)3 ACTIVE/PASSIVE ECM						
	W472	0.0	3.0	3.0	UNKNOWN	51.0	51.0
8	SLQ-25 NIXIE						
	W473	0.0	3.6	3.6	UNKNOWN	22.8	22.8
16	OPER READINESS AND TEST SYS						
	W491	2.3	3.0		-12.0	32.5	
32	ADMIN LAN						
			0.7	6.0		30.0	33.6
14	CRANE						
	W500	496.9	20.0	516.9	19.7	36.7	20.4
12	SENSOR COOLING SYSTEMS						
	W532	UNKNOWN	UNKNOWN	4.0	UNKNOWN	10.0	25.7
17	RAST/TALON HELO COMBO						
	W588	0.0	5.0		UNKNOWN	32.8	
18	RAST CONTROL STATION						
			0.0	5.0		0.0	32.8
21	1X 40MM CIWS/MULTI PURP GUN						
	W710	0.0	6.1		UNKNOWN	34.7	
22	1X 40MM CIWS/MULTI PURP GUN						
			6.1	12.2		32.3	33.5
23	21 CELL RAM LAUNCHER						
	W720	0.0	4.0	4.0	UNKNOWN	44.0	44.0
26	40MM AMMO (MIXED) 3000 RNDS						
	WF21	0.0	7.4		UNKNOWN	24.7	
27	40MM AMMO (MIXED) -- 3000 RNDS						
			7.4	14.8		-7.0	8.9
29	HELO AS565 PANTHER: (DOLPHIN)						
	WF23	0.0	4.4	4.4	UNKNOWN	5.0	5.0
19	LAMPS MKIV: AVIATION SUPPORT & SPARES						
	WF26	0.0	2.0	2.0	UNKNOWN	33.8	33.8
30	LAMPS MKIII: FUEL [JP-5]						
	WF42	0.0	63.8	63.8	UNKNOWN	9.8	9.8

PRINTED REPORT NO. 11 - P+A WEIGHTS AND VCGS

ROW	P+A WT KEY	WEIGHT ADD	WEIGHT FAC,LTON	VCG KEY	VCG ADD,FT	VCG FAC	
15	BALLIST						
	W191	1.00	0.00	BL	1.00	1.00	
1	CIC COMMAND AND DECISION MODFIG						
	W410	7.00	0.00	D6.5	-7.22	0.00	
11	CS HOLD UP BATTERY						
	W410	30.00	0.00	BL	3.50	1.00	
3	NAV SYS (1/2 DDG 51)						
	W420	3.80	-1.00	D10	16.00	1.00	
2	EXCOMM (1/2 DDG51)						
	W440	16.00	0.00	D10	-8.20	1.00	
4	SPS-67 SSR						
	W451	1.75	0.00	D10	29.50	1.00	
6	MK XII AIMS IFF						
	W455	2.30	0.00	D10	30.00	1.00	
5	SPY-3C (MINI-SPY)						
	W456	18.00	0.00	DM10	32.00	1.00	
9	SLQ-32(V)3 ACTIVE/PASSIVE ECM						
	W472	3.00	0.00	D10	21.00	1.00	
8	SLQ-25 NIXIE						
	W473	3.60	0.00	D20	-8.00	1.00	
16	OPER READINESS AND TEST SYS						
	W491	3.00	0.00	D10	2.50	1.00	
32	ADMIN LAN						
	W491	0.70	0.00	BL	30.00	0.00	
14	CRANE						
	W500	20.00	0.00	D6.5	5.00	1.00	
12	SENSOR COOLING SYSTEMS						

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        W532        4.00       -1.00     BL          10.00      1.00
    17  RAST/TALON HELO COMBO
        W588        5.00        0.00     D20          2.00      1.00
    18  RAST CONTROL STATION
        W588        0.00        0.00     D20          0.00      0.00
    21  1X 40MM CIWS/MULTI PURP GUN
        W710        6.10        0.00     D6.5         3.00      1.00
    22  1X 40MM CIWS/MULTI PURP GUN
        W710        6.10        0.00     D15          3.00      1.00
    23  21 CELL RAM LAUNCHER
        W720        4.00        0.00     DM10        14.00      1.00
    26  40MM AMMO (MIXED) 3000 RNDS
        WF21        7.40        0.00     D6.5        -7.00      1.00
    27  40MM AMMO (MIXED) -- 3000 RNDS
        WF21        7.40        0.00     D15         -7.00      0.00
    29  HELO AS565 PANTHER: (DOLPHIN)
        WF23        4.40        0.00     D20          5.00      0.00
    19  LAMPS MKIV: AVIATION SUPPORT & SPARES
        WF26        2.00        0.00     D20          3.00      1.00
    30  LAMPS MKIII: FUEL [JP-5]
        WF42       63.80        0.00     BL           9.84      0.00
C,E>RUN,SPAC
COMMAND STRING IS:
  RUN,SPACE MODULE

    ASSET/MONOSC VERSION 3.3+ - SPACE MODULE - 2/11/95  11.19.11.

PRINTED REPORT NO.  1 - SUMMARY

COLL PROTECT SYSTEM-PRESENT                 HAB STANDARD-NAVY
SONAR DOME-NONE                             UNIT COMMANDER-NONE

FULL LOAD WT, LTON          3813.2          HAB STANDARD FAC          0.000
TOTAL CREW ACC               122.           PASSWAY MARGIN FAC        0.000
HULL AVG DECK HT, FT          10.57         AC MARGIN FAC             0.200
MR VOLUME, FT3              48700.          SPACE MARGIN FAC          0.050
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	PAYLOAD REQUIRED	AREA FT2 TOTAL REQUIRED	TOTAL AVAILABLE	VOL FT3 TOTAL ACTUAL
DKHS ONLY	991.0	4849.4	10307.8	104558.
HULL OR DKHS	2670.0	34896.6	29531.5	387374.
TOTAL	3661.0	39746.0	39839.2	491932.

SSCS GROUP	TOTAL AREA FT2	DKHS AREA FT2	PERCENT TOTAL AREA
1. MISSION SUPPORT	4985.4	1608.3	12.5
2. HUMAN SUPPORT	7923.7	381.5	19.9
3. SHIP SUPPORT	12144.9	1572.1	30.6
4. SHIP MOBILITY SYSTEM	12799.3	1056.5	32.2
5. UNASSIGNED	1892.7	230.9	4.8
TOTAL	39746.0	4849.4	100.0

PRINTED REPORT NO. 2 - MISSION SUPPORT AREA

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2
1.	MISSION SUPPORT	4985.4	1608.3
1.1	COMMAND,COMMUNICATION+SURV	2869.7	1305.0
1.11	EXTERIOR COMMUNICATIONS	730.0	95.0

*1.111	RADIO	730.0	95.0
1.112	UNDERWATER SYSTEMS		
1.12	SURVEILLANCE SYS	570.0	470.0
*1.121	SURFACE SURV (RADAR)	570.0	470.0
1.122	UNDERWATER SURV (SONAR)		
1.13	COMMAND+CONTROL	1008.0	608.0
*1.131	COMBAT INFO CENTER	400.0	
1.132	CONNING STATIONS	608.0	608.0
1.1321	PILOT HOUSE	528.0	528.0
1.1322	CHART ROOM	80.0	80.0
1.14	COUNTERMEASURES	192.0	132.0
*1.141	ELECTRONIC	172.0	132.0
*1.142	TORPEDO	20.0	
1.143	MISSILE		
1.15	INTERIOR COMMUNICATIONS	339.4	
1.16	ENVIRONMENTAL CNTL SUP SYS	30.3	
1.2	WEAPONS	1144.0	244.0
*1.21	GUNS	144.0	144.0
*1.22	MISSILES	100.0	100.0
1.23	ROCKETS		
1.24	TORPEDOS		
1.25	DEPTH CHARGES		
*1.26	MINES	900.0	
1.27	MULT EJECT RACK STOW		
1.28	WEAP MODULE STA & SERV INTER		
1.3	AVIATION	625.0	50.0
1.31	AVIATION LAUNCH+RECOVERY	25.0	
1.311	LAUNCHING+RECOVERY AREAS		
*1.312	LAUNCHING+RECOVERY EQUIP	25.0	
1.32	AVIATION CONTROL		
1.321	FLIGHT CONTROL		
1.322	NAVIGATION		
1.323	OPERATIONS		
1.33	AVIATION HANDLING		
*1.34	AIRCRAFT STOWAGE	450.0	
1.35	AVIATION ADMINISTRATION		
*1.36	AVIATION MAINTENANCE	50.0	50.0
1.37	AVIATION ORDINANCE		
1.372	CONTROL		
1.373	HANDLING		
1.374	STOWAGE		
1.38	AVIATION FUEL SYS		
*1.39	AVIATION STORES	100.0	
1.4	AMPHIBIOUS		
1.5	CARGO		
1.6	INTERMEDIATE MAINT FAC	185.7	
1.64	STOWAGE	185.7	
1.641	WEAPONS	185.7	
1.7	FLAG FACILITIES		
1.73	HANDLING		
1.74	STOWAGE		
1.8	SPECIAL MISSIONS		
1.9	SM ARMS,PYRO+SALU BAT	161.0	9.3
1.91	SM ARMS (LOCKER)	40.8	
1.92	PYROTECHNICS (LOCKER)	9.3	9.3
1.93	SALUTING BAT (MAGAZINE)	13.8	
1.95	SECURITY FORCE EQUIP	97.1	

PRINTED REPORT NO. 3 - HUMAN SUPPORT AREA

HAB STD = NAVY

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2

2.	HUMAN SUPPORT	7923.7	381.5
2.1	LIVING	4403.5	340.0
2.11	OFFICER LIVING	1565.0	340.0
2.111	BERTHING	1360.0	260.0
2.1111	SHIP OFFICER	1360.0	260.0
2.1115	FLAG OFFICER		
2.112	SANITARY	205.0	80.0
2.1121	SHIP OFFICER	205.0	80.0
2.1125	FLAG OFFICER		
2.12	CPO LIVING	592.5	
2.121	BERTHING	465.0	
2.122	SANITARY	127.5	
2.13	CREW LIVING	2097.0	
2.131	BERTHING	1800.0	
2.132	SANITARY	297.0	
2.133	RECREATION		
2.1332	LIBRARY		
2.14	GENERAL SANITARY FACILITIES	110.0	
2.141	LADIES RETIRING ROOM	80.0	
2.142	BRIDGE WASHROOM+WC	15.0	
2.143	DECK WASHROOM+WC	15.0	
2.15	SHIP RECREATION FAC	39.0	
2.152	MOTION PIC FILM+EQUIP	24.4	
2.153	PHYSICAL FITNESS	14.6	
2.154	TV ROOM		
2.16	TRAINING		
2.2	COMMISSARY	2316.7	
2.21	FOOD SERVICE	1448.0	
2.211	OFFICER (MESS+LOUNGE)	496.6	
2.212	CPO (MESS+LOUNGE)	394.0	
2.213	CREW (MESS+LOUNGE)	557.4	
2.22	COMMISSARY SERVICE SPACES	544.6	
2.23	FOOD STORAGE+ISSUE	324.2	
2.231	CHILL PROVISIONS	79.4	
2.232	FROZEN PROVISIONS	77.7	
2.233	DRY PROVISIONS	167.0	
2.234	ISSUE		
2.3	MEDICAL+DENTAL (MEDICAL)	300.0	
2.4	GENERAL SERVICES	523.2	
2.41	SHIP STORE FACILITIES	244.6	
2.411	SHIP STORE	61.0	
2.416	SHIP STORE STORES	183.6	
2.42	LAUNDRY FACILITIES	186.7	
2.43	DRY CLEANING		
2.44	BARBER SERVICE	80.0	
2.46	POSTAL SERVICE		
2.47	BRIG		
2.48	RELIGIOUS	12.0	
2.5	PERSONNEL STORES	150.4	41.5
2.51	BAGGAGE	21.4	
2.52	MESSROOM STORES	59.0	11.5
2.55	FOUL WEATHER GEAR (LOCKER)	30.0	30.0
2.57	FOLDING CHAIR STOREROOM	40.0	
2.6	CBR PROTECTION	209.8	
2.61	CBR DECON STATIONS		
2.62	CBR DEFENSE EQP STRMS	209.8	
2.63	CPS AIRLOCKS		
2.7	LIFESAVING EQUIPMENT	20.0	
2.71	LIFEJACKET LOCKER	20.0	

PRINTED REPORT NO. 4 - SHIP SUPPORT AREA

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2

3.	SHIP SUPPORT	12144.9	1572.1
3.1	SHIP CNTL SYS(STEERING&DIVING)	564.0	
3.2	DAMAGE CONTROL	371.6	
3.22	REPAIR STATIONS	179.6	
3.25	FIRE FIGHTING	192.0	
3.3	SHIP ADMINISTRATION	959.3	
3.5	DECK AUXILIARIES	687.6	212.9
3.51	ANCHOR HANDLING	302.5	
3.52	LINE HANDLING	172.2	
3.53	TRANSFER-AT-SEA	212.9	212.9
3.6	SHIP MAINTENANCE	1128.0	
3.61	ENGINEERING DEPT	694.4	
3.611	AUX (FILTER CLEANING)	90.0	
3.612	ELECTRICAL	98.4	
3.613	MECH (GENERAL WK SHOP)	446.0	
3.614	PROPULSION MAINTENANCE	60.0	
3.62	OPERATIONS DEPT (ELECT SHOP)	304.6	
3.63	WEAPONS DEPT (ORDINANCE SHOP)	59.0	
3.64	DECK DEPT (CARPENTER SHOP)	70.0	
3.7	STOWAGE	2039.4	
3.71	SUPPLY DEPT	1548.3	
3.711	HAZARDOUS MATL	134.7	
3.712	SPECIAL CLOTHING	46.1	
3.713	GEN USE CONSUM+REPAIR PART	861.1	
3.714	MISCELLANEOUS	34.2	
3.715	STORES HANDLING	472.2	
3.72	ENGINEERING DEPT	28.3	
3.73	OPERATIONS DEPT	39.5	
3.74	DECK DEPT (BOATSWAIN STORES)	350.0	
3.75	WEAPONS DEPT	25.2	
3.76	EXEC DEPT (MASTER-AT-ARMS STOR)	29.3	
3.78	CLEANING GEAR STOWAGE	18.9	
3.8	ACCESS (INTERIOR-NORMAL)	6395.1	1359.3

PRINTED REPORT NO. 5 - SHIP MACHINERY SYSTEM AREA

SSCS	GROUP	TOTAL AREA FT2	DKHS AREA FT2
4.	SHIP MACHINERY SYSTEM	12799.3	1056.5
4.1	PROPULSION SYSTEM	2391.6	378.2
4.13	INTERNAL COMBUSTION	676.1	68.0
4.132	COMBUSTION AIR		
4.133	EXHAUST	136.1	68.0
4.134	CONTROL	540.0	
4.14	GAS TURBINE	1715.5	310.1
4.142	COMBUSTION AIR	266.1	133.0
4.143	EXHAUST	509.5	177.1
4.144	CONTROL	940.0	
4.17	AUX PROPULSION SYSTEMS		
4.2	PROPULSOR & TRANSMISSION SYST		
4.3	AUX MACHINERY	10407.7	678.3
4.31	GENERAL (AUX MACH DELTA)	8258.6	
4.32	A/C & REFRIGERATION	1422.0	678.3
4.321	A/C (INCL VENT)	1324.8	678.3
4.322	REFRIGERATION	97.2	
4.33	ELECTRICAL	246.6	
4.331	POWER GENERATION	119.7	
4.3311	SHIP SERVICE PWR GEN		
4.3314	400 HERTZ	119.7	
4.332	PWR DIST & CNTRL	1.9	
4.334	DEGAUSSING	125.0	

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 4.34      POLUTION CONTROL SYSTEMS          134.4
 4.35      MECHANICAL SYSTEMS                346.0

PRINTED REPORT NO.  6 - REQUIRED TANKAGE

POLLUTION CNTRL IND-PRESENT

    ENDURANCE FUEL, FT3        24003.
    AVIATION FUEL, FT3          2814.
    FRESH WATER, FT3             653.
    SEWAGE, FT3                  245.
    WASTE OIL WATER, FT3         480.
    CLEAN BALLAST, FT3             0.
    TANKAGE MARGIN, FT3            0.
                               --------
    TANKAGE VOL REQ, FT3       28194.
C,E>RUN,DESIGN
COMMAND STRING IS:
  RUN,DESIGN SUMMARY

    ASSET/MONOSC VERSION 3.3+ - DESIGN SUMMARY - 2/11/95  11.21.00.

PRINTED REPORT NO. 1 - SUMMARY

SHIP COMMENT TABLE

  PRINCIPAL CHARACTERISTICS - FT
LBP                                  380.0
LOA                                  398.3
BEAM, DWL                             51.0
BEAM, WEATHER DECK                    54.5
DEPTH @ STA 10                        30.0
DRAFT TO KEEL DWL                     15.6
DRAFT TO KEEL LWL                     15.1
FREEBOARD @ STA 3                     19.3
-
GMT                                    6.1
CP                                   0.570
CX                                   0.795
-

SPEED(KT):   MAX= 26.0   SUST= 25.0
ENDURANCE:   8000.0 NM AT 14.0 KTS
-

TRANSMISSION TYPE:               ELECT
MAIN ENG: 2 RGT          @ 15108.4 HP

SHAFT POWER/SHAFT:          13636.6 HP
PROPELLERS: 2 - FP        - 11.6 FT DIA

SEP GEN:   2 D DIESEL @   2737.5 KW

-
24 HR LOAD                          1075.0
MAX MARG ELECT LOAD                 2563.6

            OFF   CPO   ENL      TOTAL
MANNING      15    13    82        110
ACCOM        17    15    90        122
-

     WEIGHT SUMMARY - LTON
GROUP 1 - HULL STRUCTURE      1289.7
GROUP 2 - PROP PLANT           272.3
GROUP 3 - ELECT PLANT          248.0
GROUP 4 - COMM + SURVEIL       129.8
GROUP 5 - AUX SYSTEMS          516.9
GROUP 6 - OUTFIT + FURN        307.2
GROUP 7 - ARMAMENT              20.6
--------------------------------------

SUM GROUPS 1-7                2784.5
DESIGN MARGIN                  347.9
--------------------------------------

LIGHTSHIP WEIGHT              3132.4
LOADS                          680.8
--------------------------------------

FULL LOAD DISPLACEMENT        3813.2
FULL LOAD KG:   FT              19.5

MILITARY PAYLOAD WT - LTON   191.5
USABLE FUEL WT - LTON         517.1

     AREA SUMMARY - FT2
HULL AREA                 -   29531.5
SUPERSTRUCTURE AREA       -   10307.8
--------------------------------------

TOTAL AREA                    39839.2

     VOLUME SUMMARY    - FT3
HULL VOLUME              -  387373.8
SUPERSTRUCTURE VOLUME -     104558.4
--------------------------------------

TOTAL VOLUME                491932.2
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PRINTED REPORT NO. 2 - MANNING AND ACCOMMODATION SUMMARY

CREW ACCOM MARGIN FAC 0.10

	SHIPS CREW	AIR DETACH	FLAG STAFF /OTHER	TOTAL MANNING	TOTAL ACCOMMODATION
OFFICERS	11.	4.	0.	15.	17.
CPO	12.	1.	0.	13.	15.
OEM	76.	6.	0.	82.	90.
TOTAL	99.	11.	0.	110.	122.

PRINTED REPORT NO. 3 - INDICATORS

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MISSION
  DESIGN MODE IND-ENDURANCE
  ENDUR DISP IND -AVG DISP
  ENDUR DEF IND  -USN
  SUSTN SPEED IND-GIVEN
  ENDUR SPEED IND-GIVEN
HULL FORM FACTORS
  HULL OFFSETS IND-GIVEN
  HULL DIM IND     -GEOSIM
HULL BOUNDARY CONDITIONS
  HULL BC IND     -CONV DD
  HULL STA IND    -OPTIMUM
SHELL APPENDAGES
  BILGE KEEL IND -PRESENT
  SKEG IND        -PRESENT
MARGIN LINE
  MARGIN LINE IND-CALC
HULL SUBDIVISION FACTORS
  HULL SUBDIV IND-CALC
INNER BOTTOM
  INNER BOTTOM IND-PRESENT
HULL LOADS
  HULL LOADS IND -CALC
  SHOCK FNDTN IND-SHOCK
STRUCTURAL ARANGEMENT
  BOT PLATE LIMIT IND-CALC
STIFFENERS
  STIFFENER SHAPE IND-CALC
DKHS GEOM FACTORS
  DKHS GEOM IND   -GENERATE
  DKHS SIZE IND   -AUTO X
DKHS MATERIALS
  DKHS MTRL TYPE IND-HTS
  FIRE PROTECT IND   -NONE
DKHS LOADS
  BLAST RESIST IND-7 PSI
ARRANGEMENT TYPES
  MECH CL ARR IND   -
  MECH PORT ARR IND -
  MECH STBD ARR IND -
  ELECT PG ARR 1 IND-M-PG
  ELECT PG ARR 2 IND-
  ELECT DL ARR IND   -MTR
ARRANGEMENT CG
  MACHY KG IND    -CALC
ENGINE CONFIG FACTORS
  ENG ENDUR RPM IND    -CALC
  SEC ENG USAGE IND    -
  ENDUR CONFIG IND     -NO TS
  GT ENG ENCL IND      -84 DBA
GEARS
  SEC ENG 2 SPD GEAR IND-
  GEAR IMPED MASS IND    -NONE
PROPULSION SHAFTING
  SHAFT SUPPORT TYPE IND-POD
  SHAFT SYS SIZE IND     -CALC
PROPULSION SHAFT BEARING
  THRUST BRG LOC IND-CALC
PROPELLER FACTORS
  PROP TYPE IND   -FP
  PROP SERIES IND-ANALYTIC
  PROP DIA IND    -CALC
  PROP AREA IND   -CALC
  PROP LOC IND    -CALC
  PITCH RATIO IND-CALC
OPEN WATER PROP DATA
  PROP ID IND     -
PROPULSION SUPPORT SYS
  INLET TYPE IND      -PLENUM
  DUCT SILENCING IND -BOTH
  EXHAUST IR SUPP IND-PRESENT
SS GENERATOR FACTORS
  SS SYS TYPE IND-SEP
  FREQ CONV IND  -
SS GENERATOR SIZE
  SS GEN SIZE IND-NON STD
SS ENGINES
  SS ENG SELECT IND -GIVEN
  SS ENG MODEL IND  -A-12V270
  SS ENG TYPE IND   -D DIESEL
  SS ENG SFC EQN IND-DIESEL
  SS ENG SIZE IND   -CALC
SONAR SYSTEM
  SONAR DOME IND -NONE
  SONAR DRAG IND -
CLIMATE CONTROL


  COLL PROTECT SYS IND-PRESENT
  REFER MACHY LOC IND -OUTSIDE
  AUX BOILER TYPE IND -ELECTRIC
SEA WATER SYSTEMS

AIR AND MISC FLUID SYSTEM

RUDDERS
  RUDDER SIZE IND-CALC
  RUDDER TYPE IND-SPADE
ROLL FINS
  FIN SIZE IND   -CALC
```

```
  DIESEL ENG MOUNT IND-COMPOUND
MAIN ENGINES
  MAIN ENG SELECT IND-GIVEN
  MAIN ENG MOD IND -GE-LM1600-VAN2
  MAIN ENG TYPE IND  -RGT
  MAIN ENG SFC EQ IND-POLY QN
  MAIN ENG SIZE IND  -CALC
SEC ENGINES
  SEC ENG SELECT IND -
  SEC ENG MODEL IND  -
  SEC ENG TYPE IND   -
  SEC ENG SFC EQN IND-
  SEC ENG SIZE IND   -
TRANSMISSION FACTORS
  TRANS TYPE IND -ELECT
  TRANS EFF IND  -CALC
ELECTRICAL TRANSMISSION
  ELECT PRPLN TYPE IND  -ACR-DCS
  ELECT PRPLN RATIND IND-CALC
  AC SYNC ROTOR COOL IND-AIR
  TRANS LINE NODE PT IND-CALC
  SWITCHGEAR TYPE IND   -ADV

REPLENISHMENT SYSTEMS

SPECIAL PURPOSE SYSTEMS
  POLLUTION CNTL IND-PRESENT
OUTFIT AND FURNISHINGS
  UNIT CMDR IND    -NONE

FUELS AND LUBRICANTS
  SHIP FUEL TYPE IND-JP-5
RESISTANCE FACTORS
  FRICTION LINE IND    -ITTC
  RESID RESIST IND     -NRC
  WORM CURVE IND       -
  PRPLN SYS RESIST IND-CALC
SHIP WEIGHT
  SHIP LCG INPUT IND-CALC

PRINTED REPORT NO. 4 - MARGINS

HULL
  MIN FREEBOARD MARGIN, FT           .25
  HULL MARGIN STRESS, KSI           2.24


PROPULSION PLANT
  TORQUE MARGIN FAC                1.200

ELECTRIC PLANT
  ELECT LOAD DES MARGIN FAC         .200
  ELECT LOAD SL MARGIN FAC          .100

AUXILIARY SYSTEMS
  AC MARGIN FAC                     .200

OUTFIT AND FURNISHINGS
  CREW ACCOM MARGIN FAC             .100

WEIGHT MARGINS
  GROWTH WT MARGIN, LTON              .0
  D+B WT MARGIN, LTON                 .0
  D+B WT MARGIN FAC                 .125
  D+B KG MARGIN, FT                  .00
  D+B KG MARGIN FAC                 .125

RESISTANCE FACTORS
  DRAG MARGIN FAC                   .080

SPACE FACTORS
  SPACE MARGIN FAC                  .050
  PASSWAY MARGIN FAC                .000
  TANKAGE MARGIN FAC                .000

PRINTED REPORT NO. 5 - PAYLOAD AND ADJUSTMENTS

 ROW  PAYLOAD AND ADJUSTMENT NAME
 ===  ==================================
   1  CIC COMMAND AND DECISION MODFIG
   2  EXCOMM (1/2 DDG51)
   3  NAV SYS (1/2 DDG 51)
```

4	SPS-67 SSR
5	SPY-3C (MINI-SPY)
6	MK XII AIMS IFF
8	SLQ-25 NIXIE
9	SLQ-32(V)3 ACTIVE/PASSIVE ECM
11	CS HOLD UP BATTERY
12	SENSOR COOLING SYSTEMS
14	CRANE
15	BALLIST
16	OPER READINESS AND TEST SYS
17	RAST/TALON HELO COMBO
18	RAST CONTROL STATION
19	LAMPS MKIV: AVIATION SUPPORT & SPARES
21	1X 40MM CIWS/MULTI PURP GUN
22	1X 40MM CIWS/MULTI PURP GUN
23	21 CELL RAM LAUNCHER
24	LONGITUDNAL BULKHEADS AROUND MAGAZINE
26	40MM AMMO (MIXED) 3000 RNDS
27	40MM AMMO (MIXED) -- 3000 RNDS
29	HELO AS565 PANTHER: (DOLPHIN)
30	LAMPS MKIII: FUEL [JP-5]
32	ADMIN LAN
34	AVIATION STORES
36	MINE DETECTION HULL MOUNTED SONAR

ROW	WT KEY	WT ADD LTON	WT FAC	VCG KEY	VCG ADD FT	VCG FAC
1	W410	7.00	.000	D6.5	-7.22	.000
2	W440	16.00	.000	D10	-8.20	1.000
3	W420	3.80	-1.000	D10	16.00	1.000
4	W451	1.75	.000	D10	29.50	1.000
5	W456	18.00	.000	DM10	32.00	1.000
6	W455	2.30	.000	D10	30.00	1.000
8	W473	3.60	.000	D20	-8.00	1.000
9	W472	3.00	.000	D10	21.00	1.000
11	W410	30.00	.000	BL	3.50	1.000
12	W532	4.00	-1.000	BL	10.00	1.000
14	W500	20.00	.000	D6.5	5.00	1.000
15	W191	1.00	.000	BL	1.00	1.000
16	W491	3.00	.000	D10	2.50	1.000
17	W588	5.00	.000	D20	2.00	1.000
18	W588	.00	.000	D20	.00	.000
19	WF26	2.00	.000	D20	3.00	1.000
21	W710	6.10	.000	D6.5	3.00	1.000
22	W710	6.10	.000	D15	3.00	1.000
23	W720	4.00	.000	DM10	14.00	1.000
24	NONE	.00	.000	BL	.00	.000
26	WF21	7.40	.000	D6.5	-7.00	1.000
27	WF21	7.40	.000	D15	-7.00	.000
29	WF23	4.40	.000	D20	5.00	.000
30	WF42	63.80	.000	BL	9.84	.000
32	W491	.70	.000	BL	30.00	.000
34	NONE	2.00	.000	D20	3.00	.000
36	NONE	2.00	.000	BL	.00	.000

ROW	AREA KEY	---AREA ADD, FT2-- HULL/SS	SS/ONLY	-----AREA FAC----- HULL/SS	SS/ONLY
1	A1131	400.00	.00	.000	.000
2	A1111	635.00	95.00	.000	.000
3	NONE	.00	.00	.000	.000
4	A1121	.00	70.00	.000	.000
5	A1121	100.00	400.00	.000	.000
6	A1121	.00	.00	.000	.000

8	A1142	20.00	.00	.000	.000
9	A1141	40.00	132.00	.000	.000
11	NONE	250.00	.00	.000	.000
12	NONE	.00	.00	.000	.000
14	A1260	900.00	.00	.000	.000
15	NONE	.00	.00	.000	.000
16	NONE	.00	.00	.000	.000
17	A1312	25.00	.00	.000	.000
18	A1312	.00	.00	.000	.000
19	A1360	.00	50.00	.000	.000
21	A1210	.00	72.00	.000	.000
22	A1210	.00	72.00	.000	.000
23	A1220	.00	100.00	.000	.000
24	NONE	.00	.00	.000	.000
26	NONE	.00	.00	.000	.000
27	NONE	.00	.00	.000	.000
29	A1340	450.00	.00	.000	.000
30	A1380	.00	.00	.000	.000
32	NONE	.00	.00	.000	.000
34	A1390	100.00	.00	.000	.000
36	NONE	12.00	.00	.000	.000

ROW	KW KEY	--------KW ADD, KW--------- W CRUISE	W BATTLE	S CRUISE	------------KW FAC---------- W CRUISE	W BATTLE	S CRUISE
===	====	========	========	========	========	========	========
1	NONE	4.00	10.00	4.00	.000	.000	.000
2	NONE	4.00	7.00	5.00	.000	.000	.000
3	NONE	8.20	10.30	8.20	.000	.000	.000
4	C+S	8.00	7.00	8.00	.000	.000	.000
5	C+S	90.00	475.00	90.00	.000	.000	.000
6	C+S	3.20	4.00	3.20	.000	.000	.000
8	NONE	3.00	4.20	3.00	.000	.000	.000
9	C+S	6.40	66.00	6.40	.000	.000	.000
11	NONE	2.00	.00	2.00	.000	.000	.000
12	NONE	8.00	8.00	8.00	.000	.000	.000
14	NONE	.00	25.00	.00	.000	.000	.000
15	NONE	.00	.00	.00	.000	.000	.000
16	NONE	12.00	1.00	12.00	.000	.000	.000
17	UNRE	.00	10.00	.00	.000	.000	.000
18	UNRE	.00	1.00	.00	.000	.000	.000
19	NONE	.00	.00	.00	.000	.000	.000
21	ARM	4.00	16.00	4.00	.000	.000	.000
22	ARM	4.00	16.00	4.00	.000	.000	.000
23	ARM	2.00	5.00	2.00	.000	.000	.000
24	NONE	.00	.00	.00	.000	.000	.000
26	NONE	.00	.00	.00	.000	.000	.000
27	NONE	.00	.00	.00	.000	.000	.000
29	ARM	.00	25.00	.00	.000	.000	.000
30	NONE	.00	.00	.00	.000	.000	.000
32	NONE	1.00	.00	1.00	.000	.000	.000
34	NONE	.00	.00	.00	.000	.000	.000
36	NONE	5.00	1.00	5.00	.000	.000	.000

```
** WARNING - PERFORMANCE ANALYSIS ** (W-DEFAULTVALUES-PRFMPL)
THE FOLLOWING PARAMETERS WERE PROVIDED DEFAULT VALUES:
    ELECT DL ARR NO ARRAY                PERF DISP IND
    SIG WAVE HT                          MONTHS IN SERVICE
    MSN SPEED ARRAY                      MSN SPEED PROB ARRAY
    SIG WAVE HT ARRAY                    SEA STATE PROB ARRAY
    HULL FOULING FAC                     PROP FOULING FAC
** WARNING - PERFORMANCE ANALYSIS ** (W-CANTMAKEMAXSPDWV-PRFMSN)
 AVAILABLE POWER FROM MAIN ENGINES IS INADEQUATE TO MEET THE MAXIMUM
MISSION SPEED AT WAVE HEIGHTS OF  0.0 FT OR GREATER.
```

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 2/11/95 11.22.08.

PRINTED REPORT NO. 1 - SUMMARY

PERF DISP IND	FULL LOAD	MAIN ENG NO	2.
TOWED BODY IND	NONE	MAIN ENG TYPE IND	RGT
SHIP FUEL TYPE IND	JP-5	MAIN ENG PWR AVAIL, HP	15108.
PROP TYPE IND	FP	SEC ENG NO	0.
NO PROP SHAFTS	2.	SEC ENG TYPE IND	
SIG WAVE HT, FT	0.00	SEC ENG PWR AVAIL, HP	
MONTHS IN SERVICE	0.00	SS ENG NO	2.
HULL FOULING FAC	0.011	SS ENG TYPE IND	D DIESEL
PROP FOULING FAC	0.000	24 HR AVG ELECT LOAD, KW	1075.0
ANNUAL FUEL USAGE, BBL			

SPEED PERFORMANCE SUMMARY

SPEED KT	DRAG LBF	RANGE NM	REQ BHP HP	PRPLN ENG MN	O/L SC	SFC LBM/HP-HR	FUEL FLOW LTON/HR	FUEL CONS NM/LTON	PROP COEF	TRNSP EFF
14.0	54127.	9289.	3532.	1	0	.540	.78	18.0	0.722	103.9
15.0	59431.	8989.	4138.	1	0	.510	.86	17.4	0.725	95.0
16.0	65659.	8585.	4863.	1	0	.485	.96	16.6	0.727	86.2
17.0	73875.	8012.	5812.	1	0	.462	1.09	15.5	0.727	76.7
18.0	83575.	7368.	6968.	1	0	.444	1.26	14.2	0.726	67.7
19.0	94317.	6717.	8316.	1	0	.431	1.46	13.0	0.725	59.9
20.0	105344.	6122.	9797.	1	0	.423	1.68	11.8	0.725	53.5
21.0	116941.	5565.	11440.	1	0	.419	1.94	10.8	0.724	48.1
22.0	131730.	4901.	13552.	2	0	.421	2.31	9.5	0.723	42.6
23.0	150355.	4416.	16266.	2	0	.408	2.68	8.5	0.719	37.1
24.0	173210.	3890.	19706.	2	0	.399	3.18	7.5	0.715	31.9
25.0	201849.	3326.	24172.	2	0	.397	3.87	6.4	0.709	27.1
26.0	237229.	2750.	29935.	2	0	.404	4.87	5.3	0.701	22.8
26.0	238919.	2725.	30216.	2	0	.405	4.93	5.3	0.700	22.6

PRINTED REPORT NO. 2 - MISSION PERFORMANCE SUMMARY

ANNUAL FUEL USAGE, BBL 28963.

MISSION PROFILE SPEED KT	PERCENT	SIG WAV HT-FT	PERCENT	RANGE NM	FUEL FLOW LTON/HR	FUEL CONS NM/LTON	PROPUL COEF	TRNSP EFF
6.0	11.9	0.0	1.7					
14.0	46.6	4.0	15.7					
20.0	35.6	6.5	11.6	7662.	1.28	14.8	0.718	121.8
25.0	4.4	10.2	42.0					
30.0	1.5	17.0	29.0					
15.8		10.6						

PRINTED REPORT NO. 3 - DETAILED MISSION PERFORMANCE

SIG WAVE HT, FT = 0.0
PROBABILITY OF
OCCURANCE, PCNT = 1.7

SPEED KT	PROBABILITY PCNT	DRAG LBF	REQ PROP HP	FUEL CONS NM/LTON
6.0	11.9	11446.	325.	18.8
14.0	46.6	54127.	3532.	18.0
20.0	35.6	105344.	9797.	11.8
25.0	4.4	201849.	24172.	6.4
26.0	1.5	238851.	30217.	5.3

```
SIG WAVE HT, FT =  4.0     SPEED PROBABILITY  DRAG     REQ PROP FUEL CONS
PROBABILITY OF               KT      PCNT     LBF         HP     NM/LTON
OCCURANCE, PCNT = 15.7    ---------------------------------------------
                             6.0     11.9     11472.      326.     18.8
                            14.0     46.6     54250.     3541.     17.9
                            20.0     35.6    105584.     9822.     11.8
                            25.0      4.4    202308.    24234.      6.4
                            26.0      1.5    238919.    30217.      5.3

SIG WAVE HT, FT =  6.5     SPEED PROBABILITY  DRAG     REQ PROP FUEL CONS
PROBABILITY OF               KT      PCNT     LBF         HP     NM/LTON
OCCURANCE, PCNT = 11.6    ---------------------------------------------
                             6.0     11.9     11534.      328.     18.8
                            14.0     46.6     54541.     3562.     17.9
                            20.0     35.6    106150.     9880.     11.8
                            25.0      4.4    203394.    24383.      6.4
                            26.0      1.5    239078.    30217.      5.3

SIG WAVE HT, FT = 10.2     SPEED PROBABILITY  DRAG     REQ PROP FUEL CONS
PROBABILITY OF               KT      PCNT     LBF         HP     NM/LTON
OCCURANCE, PCNT = 42.0    ---------------------------------------------
                             6.0     11.9     11717.      334.     18.7
                            14.0     46.6     55405.     3625.     17.7
                            20.0     35.6    107831.    10052.     11.6
                            25.0      4.4    206615.    24824.      6.3
                            25.9      1.5    239547.    30217.      5.2

SIG WAVE HT, FT = 17.0     SPEED PROBABILITY  DRAG     REQ PROP FUEL CONS
PROBABILITY OF               KT      PCNT     LBF         HP     NM/LTON
OCCURANCE, PCNT = 29.0    ---------------------------------------------
                             6.0     11.9     12415.      357.     18.5
                            14.0     46.6     58710.     3866.     17.0
                            20.0     35.6    114263.    10720.     10.9
                            25.0      4.4    218939.    26532.      5.8
                            25.6      1.5    241297.    30217.      5.2
C,E>RUN,HYDRO
COMMAND STRING IS:
  RUN,HYDROSTATIC ANALYSIS
** FATAL ERROR - HYDROSTATIC ANALYSIS ** (E-INVALIDDATA-HYSMPL)
THE FOLLOWING PARAMETERS CONTAIN INVALID OR MISSING DATA:
    COMP DEF IND                       COMP SYM INDEX ARRAY
    DAMAGED COMP ARRAY

** ENTERING PROMPT MODE **
ENTER 'QUIT' TO RETURN TO COMMAND LEVEL.

      COMP DEF IND              =
ALLOWABLE OPTIONS ARE:
  1 GIVEN                         2 CALC
PLEASE ENTER OPTION NUMBER OR OPTION STRING.
I>

      COMP SYM INDEX ARRAY      = (  21X   1)
  1 0.1000E+37
PLEASE ENTER ARRAY INPUT COMMANDS.
I>

      DAMAGED COMP ARRAY        = (  21X   1)
  1 0.1000E+37
PLEASE ENTER ARRAY INPUT COMMANDS.
I>
C,E>RUN,SEAK
COMMAND STRING IS:
  RUN,SEAKEEPING ANALYSIS
** WARNING - SEAKEEPING ANALYSIS ** (W-BALRNKRNG1-SEARNK)
```

```
AT THE FULL LOAD DRAFT,
THE FOLLOWING HULL FORM PARAMETERS ARE OUT OF THE
RANGE OF THE BALES DATA:
    CUT-UP/LBP                 ****** % OUT OF RANGE
    VERT. PRISMATIC COEF AFT   -13.45 % OUT OF RANGE

  ASSET/MONOSC VERSION 3.3+ - SEAKEEPING ANALYSIS - 2/11/95  11.23.50.

PRINTED REPORT NO. 1 - SUMMARY

APPENDAGE IND-WITH

FULL LOAD WT, LTON    3813.2

                                                      FULL LOAD
                                                      ----------
BALES RANK
 RANK OF THE SYNTHESIZED SHIP (ACTUAL DISP)              1.828
 RANK OF THE SYNTHESIZED SHIP (NORMALIZED)               3.104
 RANK OF THE CLOSEST DATA BASE HULL (NORMALIZED)         3.460
 ID NO OF CLOSEST DATA BASE SHIP                             3
MCCREIGHT RANK
 RANK OF THE SYNTHESIZED SHIP (ACTUAL SHIP)              4.191
 RANK OF THE CLOSEST DATA BASE HULL                      3.991
 ID NO OF CLOSEST DATA BASE SHIP                            32

PRINTED REPORT NO. 2 - SHIP GEOMETRY DATA

FULL LOAD WT, LTON  3813.2

                                 FULL LOAD
                               ------------
ACTUAL SHIP
 LBP, FT                          380.00
 BEAM, FT                          50.47
 DRAFT, FT                         15.12
 VERT PRISMATIC COEF (FWD)        0.7310
 VERT PRISMATIC COEF (AFT)        0.5323
 WATERPLANE COEF (FWD)            0.5832
 WATERPLANE COEF (AFT)            0.8888
 WP AREA AFT MIDSHIPS, FT2       8524.01
 LCB FROM FP, FT                  196.94
 LCF FROM FP, FT                  216.76
 BML, FT                          876.94
 CUT-UP PT FROM FP, FT             32.19

NORMALIZED SHIP
 DISP, LTON                       4232.1
 LBP, FT                          393.43
 BEAM, FT                          52.26
 DRAFT, FT                         15.65
 CUT-UP PT FROM FP, FT             33.33
C,E>RUN,COST
COMMAND STRING IS:
  RUN,COST ANALYSIS
** WARNING - COST ANALYSIS ** (W-DEFAULTVALUES-CSTMPL)
THE FOLLOWING PARAMETERS WERE PROVIDED DEFAULT VALUES:
    PAYLOAD T+E COST                    LEAD PAYLOAD COST
    FOLLOW PAYLOAD COST                 ANNUAL TRNG ORD COST
    PAYLOAD FUEL RATE                   TECH ADV COST
    ADDL FACILITY COST                  DEFERRED MMHRS REQ
    UNREP UNIT CAPACITY                 UNREP UNIT COST
    UNREP O+S COST                      KN FACTOR ARRAY
    SHIP FUEL RATE
```

ASSET/MONOSC VERSION 3.3+ - COST ANALYSIS - 2/11/95 11.24.13.

NOTE-THIS INTERIM MODULE PROVIDES GUIDANCE FOR DECISIONS REGARDING SHIP DESIGN TRADEOFFS AND COMPARATIVE EVALUATIONS. REQUESTS FOR ESTIMATES OF SHIP COSTS FOR BUDGETARY PURPOSES SHOULD BE DIRECTED TO NAVSEA.

PRINTED REPORT NO. 1 - SUMMARY

YEAR $	1995.	NO OF SHIPS ACQUIRED	100.
INFLATION ESCALATION FAC	1.513	SERVICE LIFE, YR	30.0
LEARNING RATE	0.970	ANNUAL OPERATING HRS	3000.0
FUEL COST, $/GAL	1.000	MILITARY P/L, LTON	191.5
PAYLOAD FUEL RATE, LTON/HR	0.33	LIGHTSHIP WT, LTON	3132.4
SHIP FUEL RATE, LTON/HR	0.90	FULL LOAD WT, LTON	3813.2

COST ITEM	COSTS(MILLIONS OF DOLLARS) TOT SHIP	+ PAYLOAD	= TOTAL
LEAD SHIP	508.4	99.7*	608.1
FOLLOW SHIP	240.4	90.7*	331.1
AVG ACQUISITION COST/SHIP(** SHIPS)	208.9	90.8*	299.7
LIFE CYCLE COST/SHIP(30 YEARS)			819.8
TOTAL LIFE CYCLE COST(30 YEARS)			81979.8
DISCOUNTED LIFE CYCLE COST/SHIP			47.8**
DISCOUNTED TOTAL LIFE CYCLE COST			4781.8**

*ESTIMATED VALUE
**DISCOUNTED AT 10 PERCENT

PRINTED REPORT NO. 2 - UNIT ACQUISITION COSTS

SWBS GROUP		UNITS	INPUTS	KN FACTORS	LEAD SHIP COSTS $K	FOLLOW SHIP COSTS $K
100	HULL STRUCTURE	LTON	1289.7	1.00	12938.	12162.
200	PROPULSION PLANT	HP	30216.9	2.35	27505.	25855.
300	ELECTRIC PLANT	LTON	248.0	1.00	17137.	16109.
400	COMMAND+SURVEILLANCE	LTON	129.8	3.15	10426.	9800.
500	AUX SYSTEMS	LTON	516.9	1.53	29030.	27288.
600	OUTFIT+FURNISHINGS	LTON	307.2	1.00	13295.	12498.
700	ARMAMENT	LTON	20.6	1.00	251.	236.
	MARGIN	LTON	347.9		13818.	12989.
800	DESIGN+ENGINEERING			26.06	188892.	20872.
900	CONSTRUCTION SERVICES			4.25	32942.	30966.
	TOTAL CONSTRUCTION COST				346235.	168775.
	CONSTRUCTION COST				346235.	168775.
	PROFIT(10.0 PERCENT OF CONSTRUCTION COST)				34624.	16877.
	PRICE				380859.	185652.
	CHANGE ORDERS(12/8 PERCENT OF PRICE)				45703.	14852.
	NAVSEA SUPPORT(2.5 PERCENT OF PRICE)				9521.	4641.
	POST DELIVERY CHARGES(5 PERCENT OF PRICE)				19043.	9283.
	OUTFITTING(4 PERCENT OF PRICE)				15234.	7426.
	H/M/E + GROWTH(10 PERCENT OF PRICE)				38086.	18565.
	TOTAL SHIP COST				508447.	240419.
	ESTIMATED PAYLOAD COST				99700.	90703.
SHIP PLUS PAYLOAD COST					608146.	331122.

ADJUSTED FIRST UNIT SHIP COST, $K 255765.4
COMBAT SYSTEM WEIGHT, LTON 191.5

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PROPULSION SYSTEM WEIGHT, LTON          272.3
ADJUSTED FIRST UNIT SHIP COST EQUALS
 FOLLOW SHIP TOTAL COST DIVIDED BY      0.940

PRINTED REPORT NO. 3 - LIFE CYCLE COSTS

IOC YEAR                      2010.    PAYLOAD FUEL RATE, LTON/HR    0.33
R+D PROGRAM LENGTH, YRS         10.    SHIP FUEL RATE, LTON/HR       0.90
NUMBER OF SHIPS ACQUIRED       100.    TECH ADV COST, $M             0.00
SERVICE LIFE, YRS               30.    ADDL FACILITY COST, $M        0.00
NO OF OFFICERS/SHIP             15.    DEFERRED MMHRS REQ, HR/WK       0.
NO OF ENLISTED MEN/SHIP         95.    PRODUCTION RATE, SHIPS/YR     8.00
```

30 - YEAR SYSTEMS COST
(MILLIONS OF YEAR 1995 DOLLARS)

COST ELEMENT	SHIP NONREC	PAYLOAD NONREC	OTHER NONREC	TOTAL NONREC	SYSTEM RECUR	TOTAL SYSTEM
R+D TOTAL	458.	15.	0.	473.		473.
DESIGN+DEVELMNT	169.		0.	169.		169.
TEST+EVALUATION	290.	15.	0.	305.		305.
INVESTMENT	22562.	12075.	49.	34687.		34687.
EQUIPMENT	21935.	10895.		32830.		32830.
PRIME	20891.	9079.		29970.		29970.
SUPPORT	1045.	1816.		2860.		2860.
FACILITIES			0.	0.		0.
INITIAL SPARES	627.	1180.		1807.		1807.
ASSOCIATED SYS			49.	49.		49.
OPERATIONS+SUPPRT					49456.	49456.
PERSONNEL					6757.	6757.
OPERATIONS					4018.	4018.
MAINTENANCE					17152.	17152.
ENERGY					2782.	2782.
REPL SPARES					11746.	11746.
MAJOR SUPPORT					6821.	6821.
ASSOCIATED SYS					181.	181.
LESS RESIDUAL VALUE						2637.
LIFE CYCLE TOTAL SYSTEMS COST						81980.
DISCOUNTED AT 10 PERCENT						4782.

```
COST PER VEHICLE-UNDISCOUNTED      820.
COST PER VEHICLE-DISCOUNTED         48.
C,E>RUN,MANN
COMMAND STRING IS:
  RUN,MANNING ANALYSIS

  ASSET/MONOSC VERSION 3.3+ - MANNING ANALYSIS - 2/11/95  11.24.28.

NOTE-THIS INTERIM MANNING MODEL PROVIDES GROSS TREND ANALYSIS
     BASED ON HISTORICAL MANNING DATA OF EXISTING SHIPS.
     REQUESTS FOR SHIP MANNING DETERMINATION SHOULD BE
     DIRECTED TO NAVSEA.

PRINTED REPORT NO. 1 - SUMMARY

FULL LOAD WT, LTON         3813.2

TOTAL MMHRS REQ/WK         6696.1    NO WATCH STATIONS           5.
TOTAL MMHRS AVAIL/WK       5920.0    NO WATCHSTANDERS           14.
DEFERRED MMHRS/WK           776.1    NO NON-WATCHSTANDERS       74.
```

	OFFICERS	CPO	ENLISTED	TOTAL
REQ MANNING	11.	11.	101.	123.
AVAIL MANNING	15.	13.	82.	110.
DIFFERENCE	4.	2.	-19.	-13.
ACCOMMODATIONS	17.	15.	90.	122.

PRINTED REPORT NO. 2 - MANNING AND ACCOMMODATION SUMMARY

CREW ACCOM MARGIN FAC 0.10

	SHIPS CREW	AIR DETACH	FLAG STAFF /OTHER	ACCOMMODATION
OFFICERS	11.	4.	0.	17.
CPO	12.	1.	0.	15.
OEM	76.	6.	0.	90.
TOTAL	99.	11.	0.	122.

PRINTED REPORT NO. 3 - DEPARTMENTAL MANNING ANALYSIS

DEPARTMENT	MANNING FACTOR	OFFICERS	CPO	ENLISTED	TOTAL
CO/EXEC/NAV/MED	0.7	1.	2.	10.	13.
OPERATIONS	0.5	1.	2.	24.	27.
COMBAT	0.5	2.	3.	20.	25.
ENGINEERING	0.8	2.	2.	27.	31.
SUPPLY	0.5	1.	1.	14.	16.
AVIATION	1.0	4.	1.	6.	11.
FLAG STAFF/OTHER	---	0.	0.	0.	0.
REQ MANNING		11.	11.	101.	123.
AVAIL MANNING		15.	13.	82.	110.
DIFFERENCE		4.	2.	-19.	-13.

PRINTED REPORT NO. 4 - WEEKLY FUNCTIONAL WORKLOAD ANALYSIS

FUNCTION	WORKLOAD FACTOR	WEEKLY MHRS REQ	WEEKLY MHRS AVAIL	PERCENT
OPERATIONAL MANNING (OM)	0.5	2199.1		32.8
PLANNED MAINTENANCE (PM) + CORRECTIVE MAINTENANCE (CM)	0.5	681.7		10.2
OWN UNIT SUPPORT (OUS)	0.5	1360.8		20.3
FACILITY MAINTENANCE (FM)	0.5	479.4		7.2
PRODUCTIVITY ALLOWANCE (PA)	1.0	504.4		7.5
SERVICE DIVERSION ALLOWANCE (SDA) + TRAINING (T)	1.5	1470.7		22.0
TOTAL MMHRS REQ/WK		6696.1		100.0
WATCHSTANDERS (74HRS/MAN-WK)			1036.0	
NON-WATCHSTANDERS (66HRS/MAN-WK)			4884.0	
TOTAL MMHRS AVAIL/WK			5920.0	88.4
DEFERRED MMHRS/WK			776.1	11.6

```
C,E>EXIT
DO YOU WISH TO SAVE CURRENT MODEL (Y/N)?
I>  N
DO YOU WISH TO EXIT PROGRAM (Y/N)?
I>  Y
```

APPENDIX O

ASSET DIAGRAMS

Summary and Contents

Appendix O contains the printed graphics displays from the ASSET runs compile by the CPCX design team. The printed reports are broken down as follows:

Section 1, Common Reports between Variants

- Hull Geometry Graphic Display No. 1 - Body Plan
- Hull Geometry Graphic Display No. 2 - Hull Isometric View
- Hull Geometry Graphic Display No. 3 - Hull Profile and Weatherdeck Plan View
- Hull Geometry Graphic Display No. 4 - Design Waterline Plan View
- Hull Geometry Graphic Display No. 5 - Hull Sectional Area Curve
- Hull Subdivision Graphic Display No. 1 - Midship Section
- Hull Subdivision Graphic Display No. 2 - Hull Decks and Platforms (Main Deck)
- Hull Subdivision Graphic Display No. 3 - Hull Decks and Platforms (2nd Deck)
- Hull Subdivision Graphic Display No. 4 - Hull Decks and Platforms (1st Platform)
- Hull Structure Graphic Display No. 1 - Midship Section
- Hull Structure Graphic Display No. 2 - Segment Node Points
- Appendage Graphic Display No. 1 - Hull Profile and Plan View with Appendages
- Appendage Graphic Display No. 2 - Fwd Fin Tip Position
- Propeller Graphic Display No. 2 - Transverse Section
- Machinery Graphic Display No. 1 - Ship Machinery Layout
- Machinery Graphic Display No. 2 - Machinery Box
- Machinery Graphic Display No. 3 - MR Plan Views (MMR1 & MMR2)
- Machinery Graphic Display No. 4 - MR Profile Views (MMR1 & MMR2)
- Machinery Graphic Display No. 5 - Propulsion Appendages Profile View

Section 2, Navy Variant Specific Reports

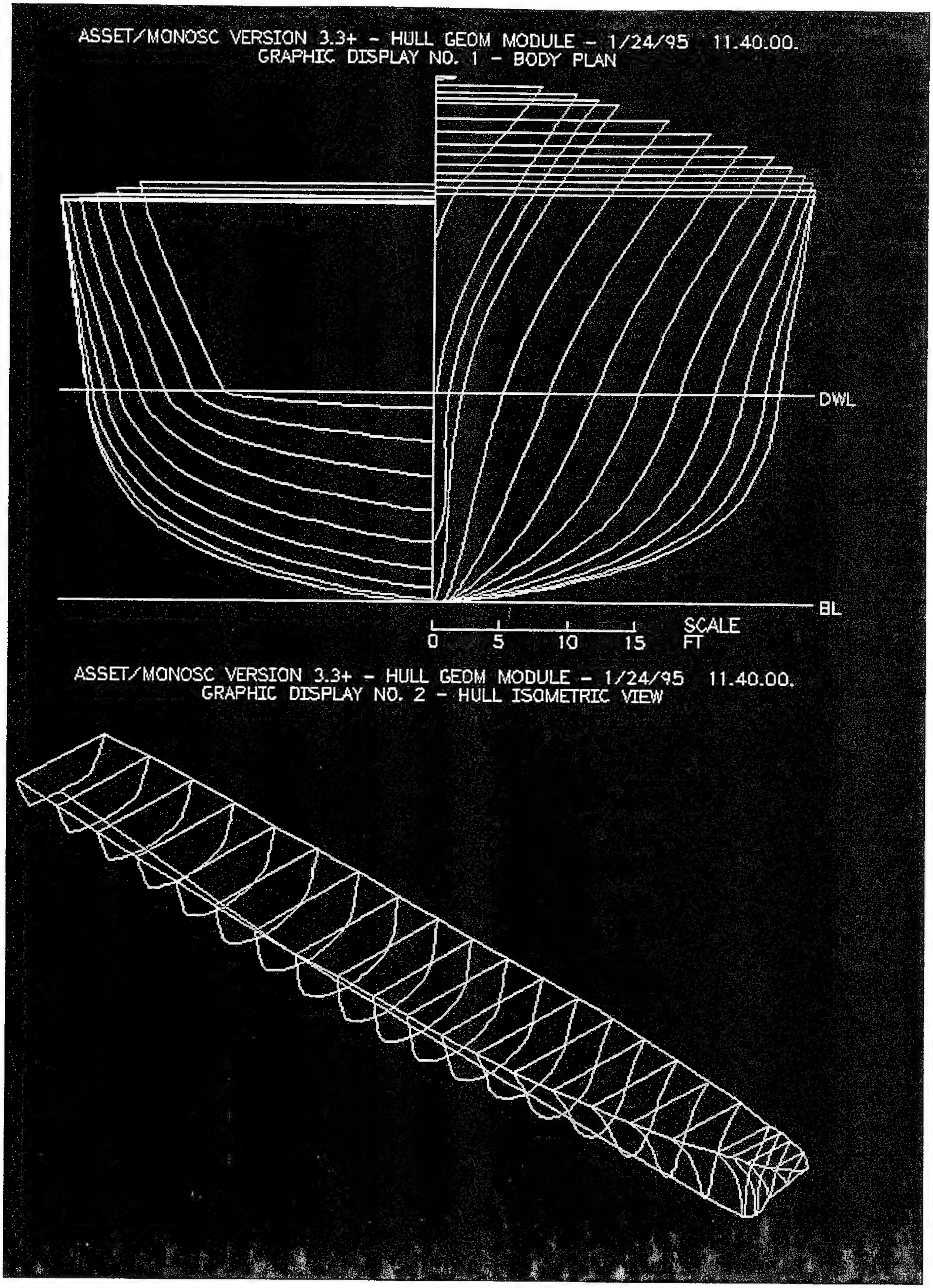
- Resistance Graphics Display No. 1 - Resistance Versus Speed
- Resistance Graphics Display No. 2 - EHP Versus Speed (3980 Lt & 3810 Lt))
- Performance Analysis Graphic Display No. 1 - Drag Versus Speed
- Performance Analysis Graphic Display No. 2 - Range Versus Speed
- Performance Analysis Graphic Display No. 3 - Total Power Versus Speed
- Performance Analysis Graphic Display No. 4 - SFC Versus Speed
- Performance Analysis Graphic Display No. 5 - Fuel Flow Versus Speed
- Performance Analysis Graphic Display No. 6 - Fuel Consumption Versus Speed
- Performance Analysis Graphic Display No. 7 - Propulsive Coefficient Versus Speed
- Performance Analysis Graphic Display No. 8 - Transport Efficiency Versus Speed

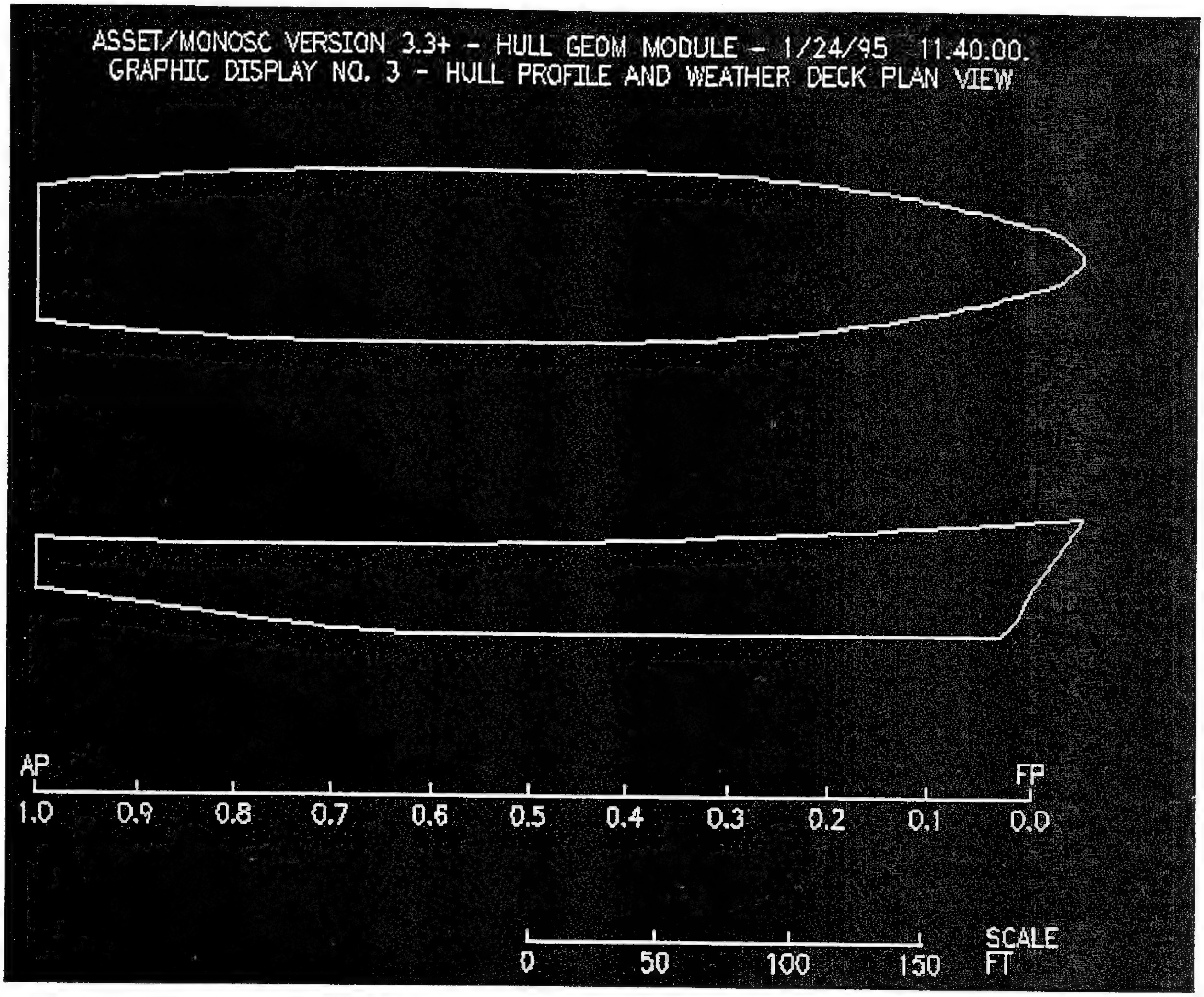
Section 3, Coast Guard Variant Specific Reports

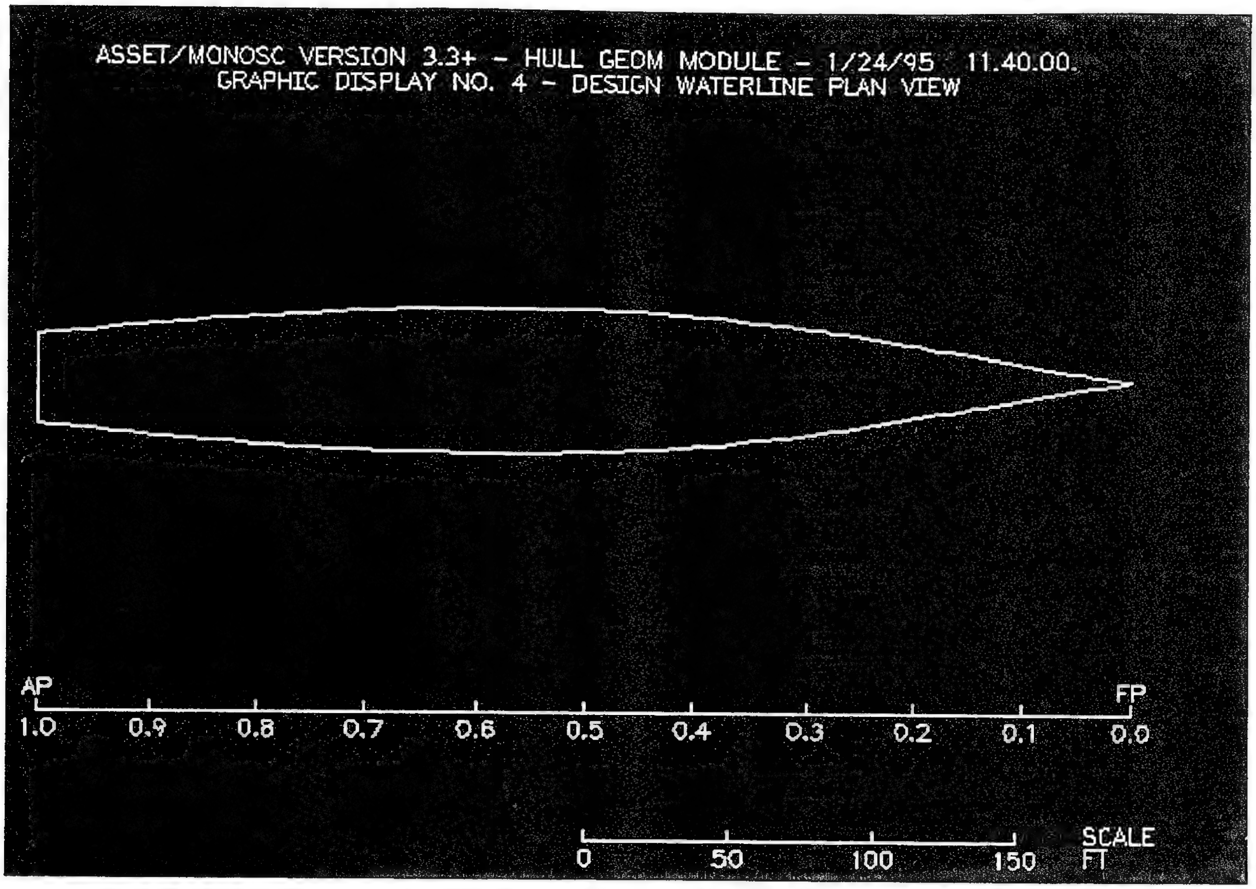
- Resistance Graphics Display No. 1 - Resistance Versus Speed
- Resistance Graphics Display No. 2 - EHP Versus Speed (3813 Lt & 3591 Lt)
- Performance Analysis Graphic Display No. 1 - Drag Versus Speed
- Performance Analysis Graphic Display No. 2 - Range Versus Speed
- Performance Analysis Graphic Display No. 3 - Total Power Versus Speed
- Performance Analysis Graphic Display No. 4 - SFC Versus Speed
- Performance Analysis Graphic Display No. 5 - Fuel Flow Versus Speed
- Performance Analysis Graphic Display No. 6 - Fuel Consumption Versus Speed

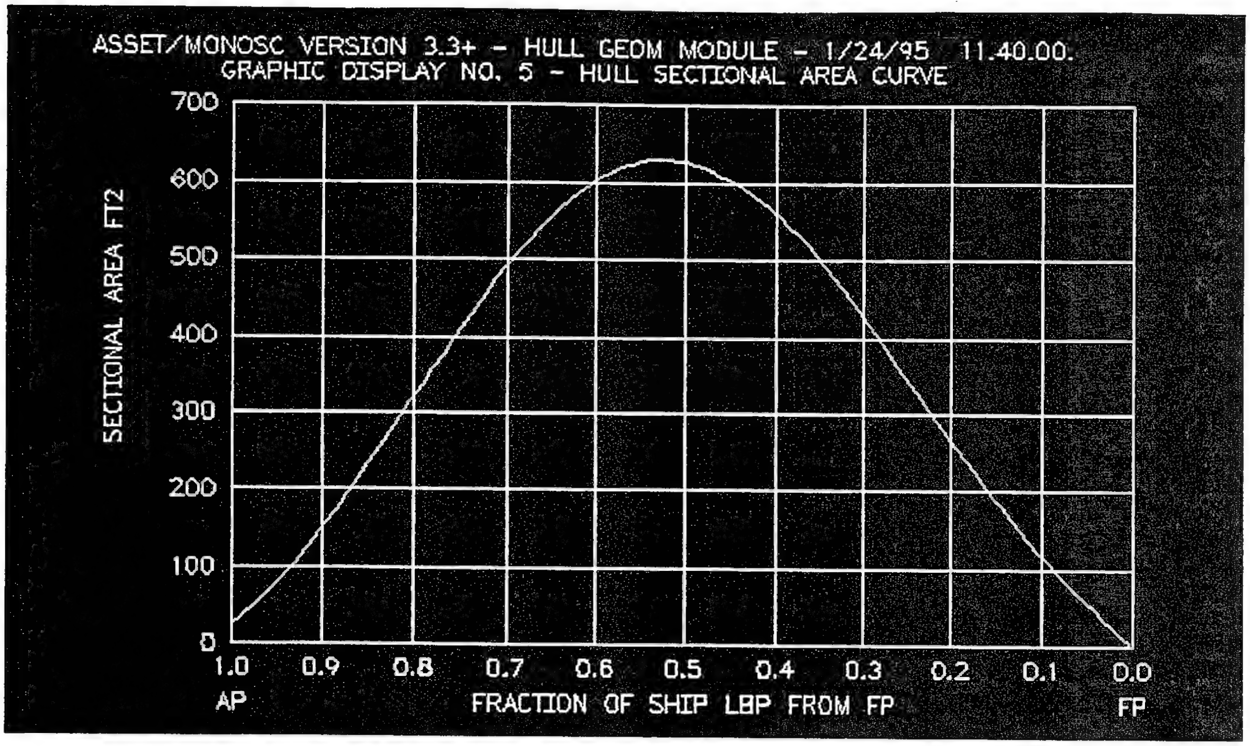
SECTION 1

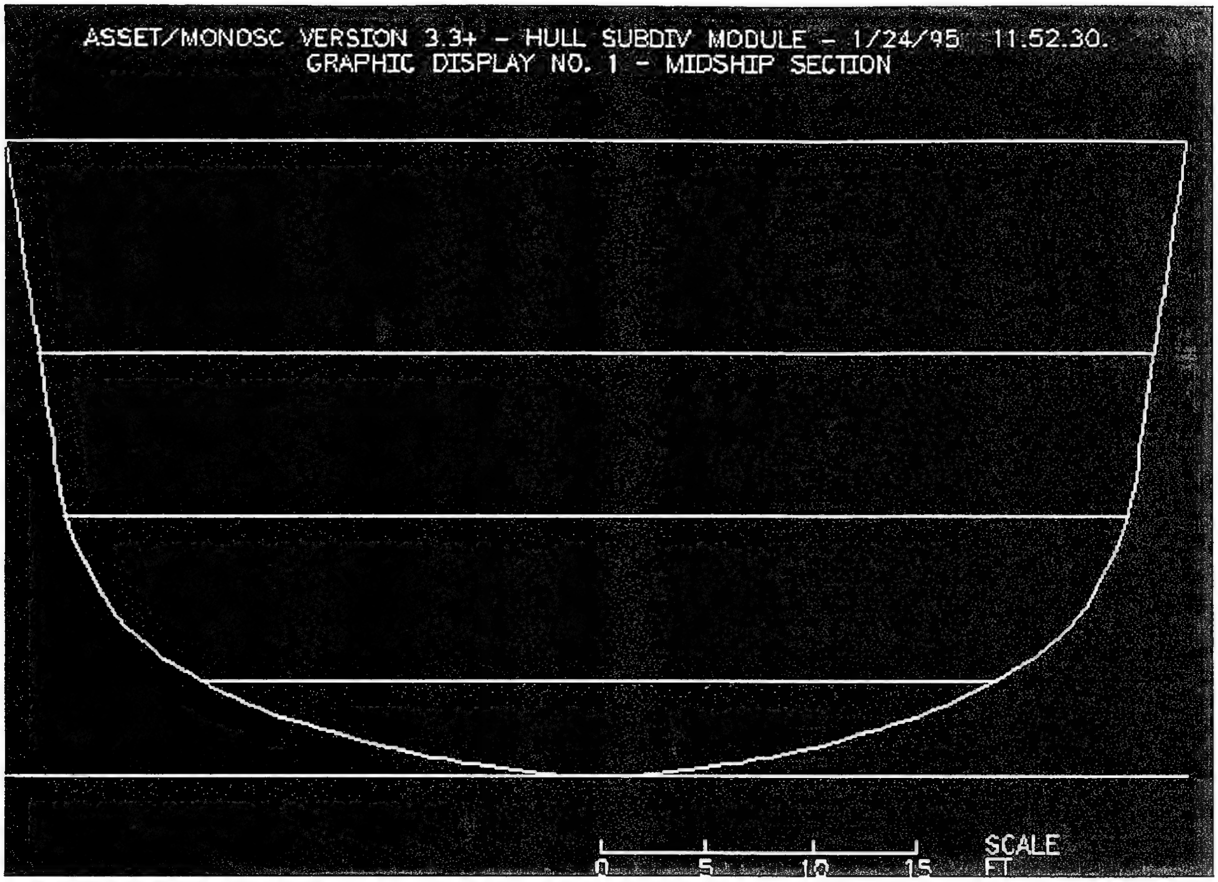
COMMON REPORTS BETWEEN VARIANTS

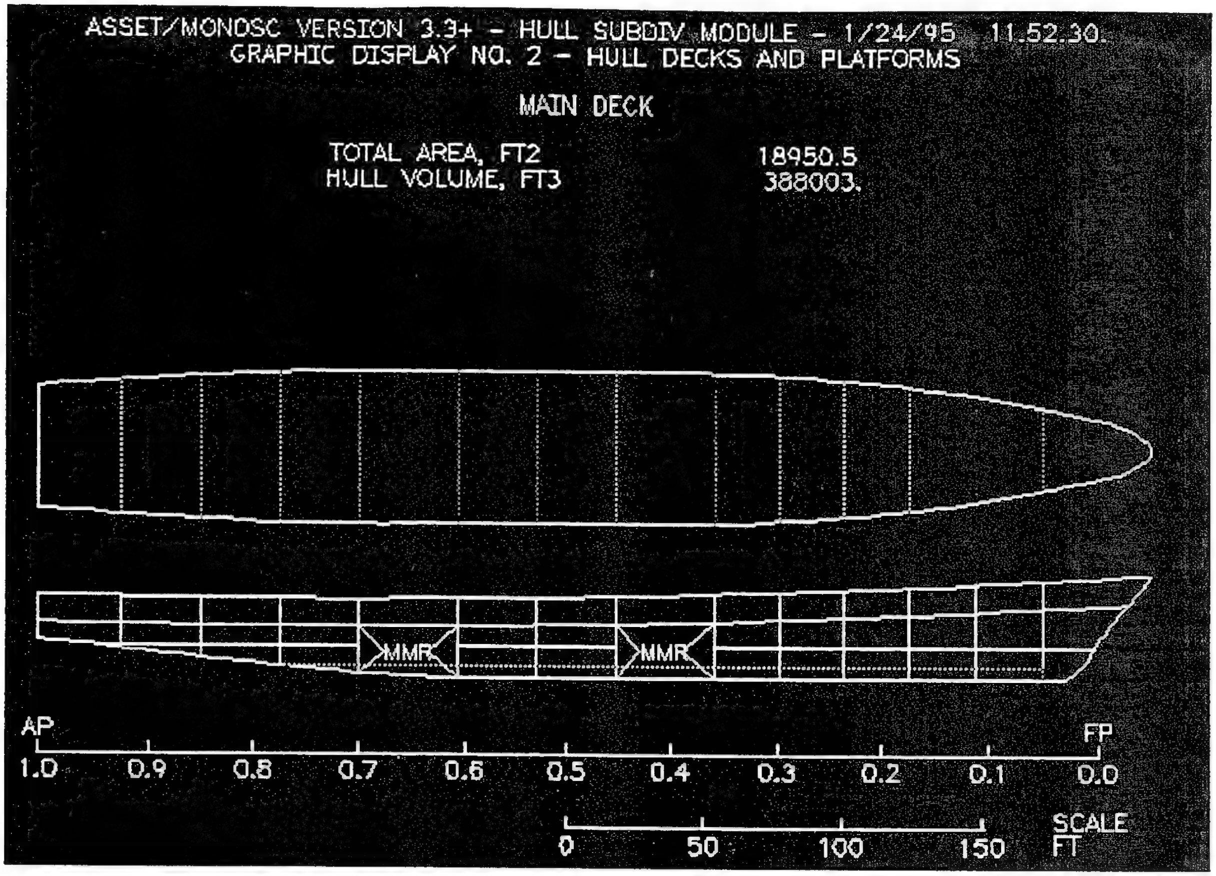

ASSET/MONOSC VERSION 3.3+ - HULL GEOM MODULE - 1/24/95 11.40.00.
GRAPHIC DISPLAY NO. 1 - BODY PLAN
DWL
BL
SCALE
FT
0
5
10
15
ASSET/MONOSC VERSION 3.3+ - HULL GEOM MODULE - 1/24/95 11.40.00.
GRAPHIC DISPLAY NO. 2 - HULL ISOMETRIC VIEW

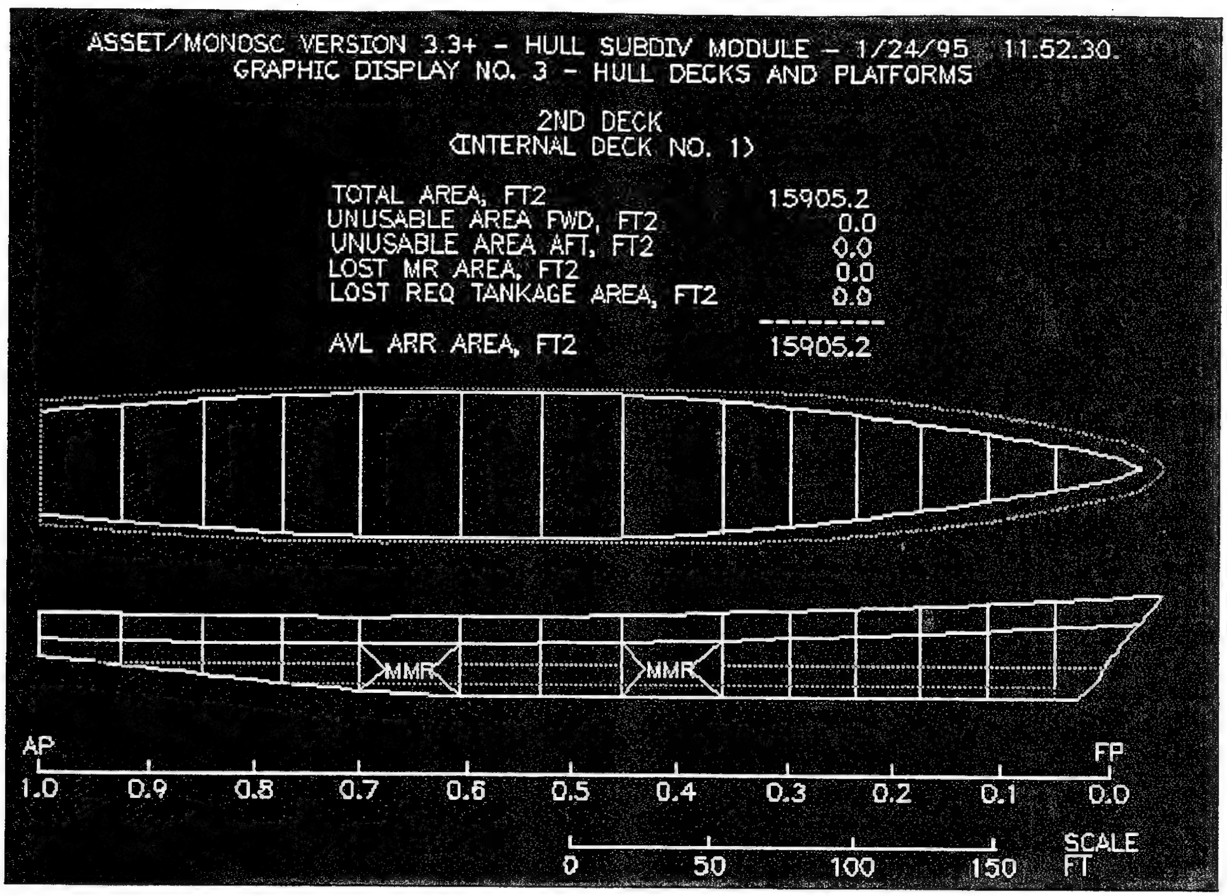

ASSET/MONOSC VERSION 3.3+ - HULL GEOM MODULE - 1/24/95 11.40.00.
GRAPHIC DISPLAY NO. 3 - HULL PROFILE AND WEATHER DECK PLAN VIEW
AP
FP
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
SCALE
FT


ASSET/MONOSC VERSION 3.3+ - HULL GEOM MODULE - 1/24/95 11.40.00.
GRAPHIC DISPLAY NO. 4 - DESIGN WATERLINE PLAN VIEW
AP
FP
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
SCALE
FT


ASSET/MONOSC VERSION 3.3+ - HULL GEOM MODULE - 1/24/95 11.40.00.
GRAPHIC DISPLAY NO. 5 - HULL SECTIONAL AREA CURVE
SECTIONAL AREA FT2
700
600
500
400
300
200
100
0
1.0
AP
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
FP
FRACTION OF SHIP LBP FROM FP


ASSET/MONOSC VERSION 3.3+ - HULL SUBDIV MODULE - 1/24/95 11.52.30.
GRAPHIC DISPLAY NO. 1 - MIDSHIP SECTION
0
5
10
15
SCALE
FT


ASSET/MONOSC VERSION 3.3+ - HULL SUBDIV MODULE - 1/24/95 11.52.30.
GRAPHIC DISPLAY NO. 2 - HULL DECKS AND PLATFORMS
MAIN DECK
TOTAL AREA, FT2 18950.5
HULL VOLUME, FT3 388003.
MMR
MMR
AP
FP
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
SCALE
FT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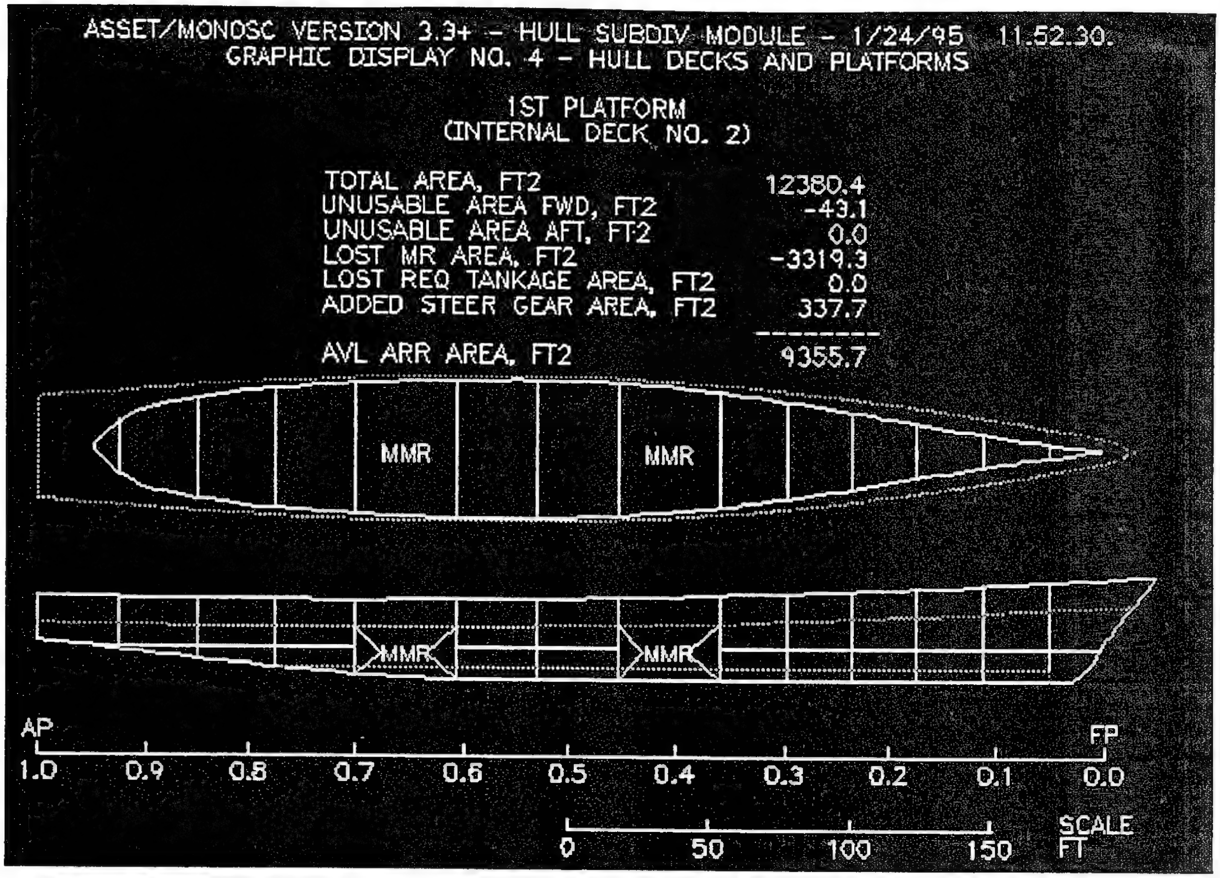
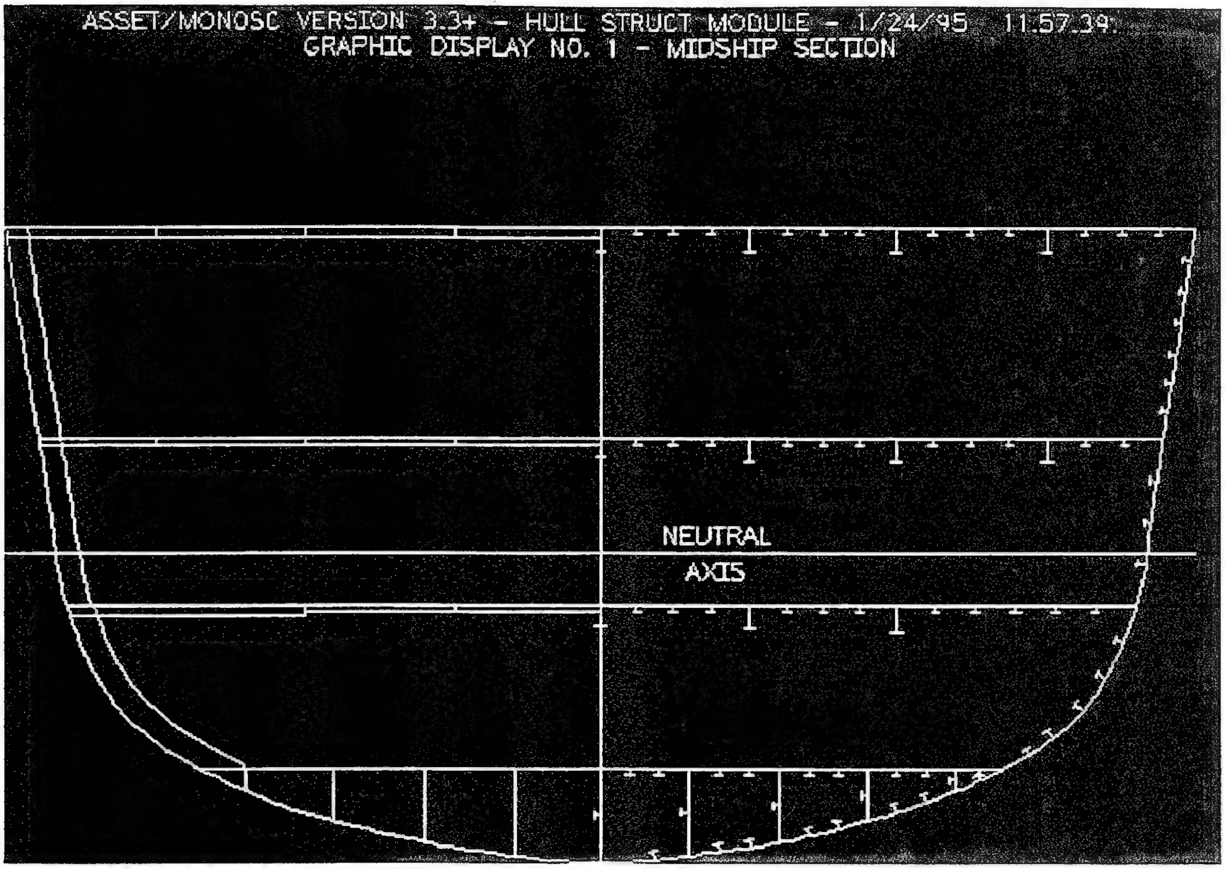
GRAPHIC DISPLAY NO. 3 - HULL DECKS AND PLATFORMS
2ND DECK
(INTERNAL DECK NO. 1)
TOTAL AREA, FT2 15905.2
UNUSABLE AREA FWD, FT2 0.0
UNUSABLE AREA AFT, FT2 0.0
LOST MR AREA, FT2 0.0
LOST REQ TANKAGE AREA, FT2 0.0
AVL ARR AREA, FT2 15905.2
MMR
MMR
AP
FP
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0
0 50 100 150
SCALE FT



ASSET/MONOSC VERSION 3.3+ - HULL SUBDIV MODULE - 1/24/95 11.52.30.
GRAPHIC DISPLAY NO. 4 - HULL DECKS AND PLATFORMS
1ST PLATFORM
(INTERNAL DECK NO. 2)
TOTAL AREA, FT2 12380.4
UNUSABLE AREA FWD, FT2 -43.1
UNUSABLE AREA AFT, FT2 0.0
LOST MR AREA, FT2 -3319.3
LOST REQ TANKAGE AREA, FT2 0.0
ADDED STEER GEAR AREA, FT2 337.7
AVL ARR AREA, FT2 9355.7
MMR
MMR
MMR
MMR
AP
FP
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0
0 50 100 150
SCALE FT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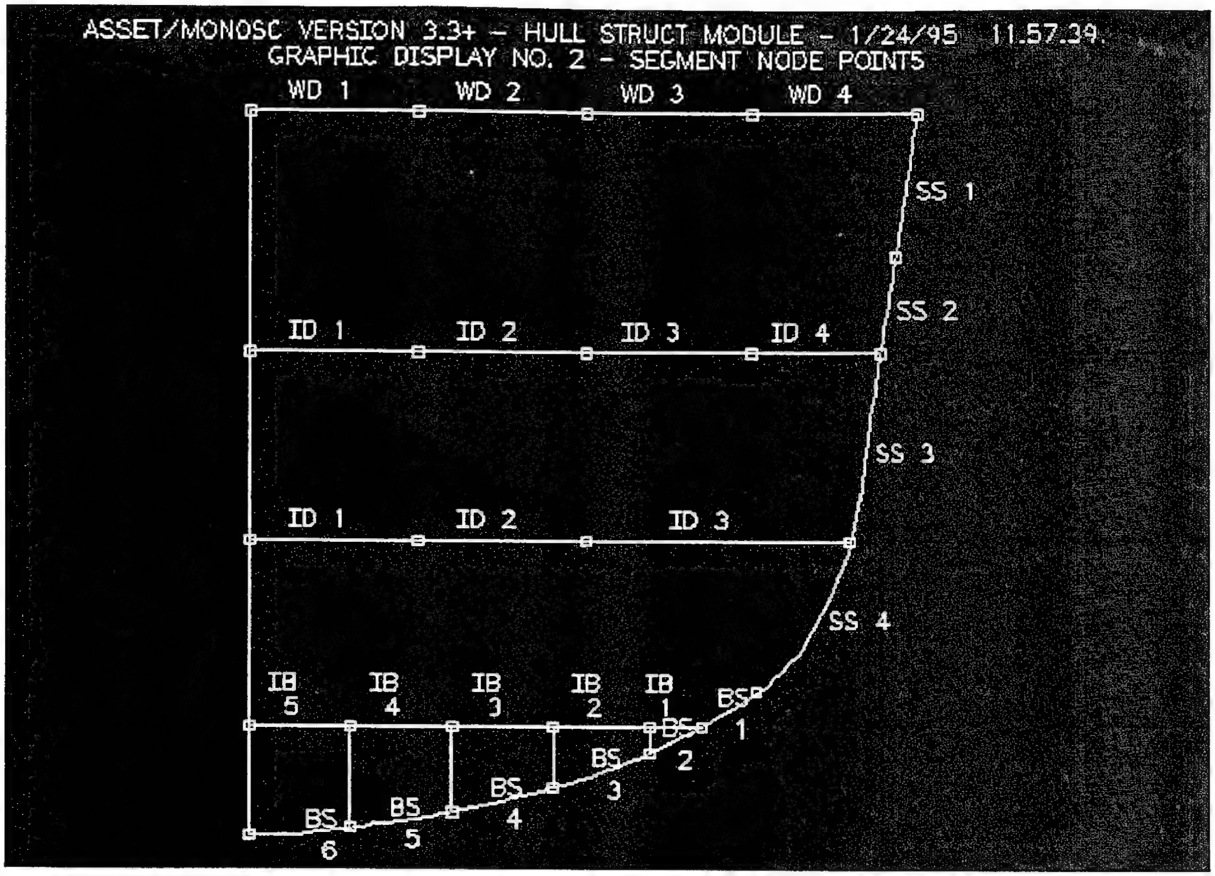
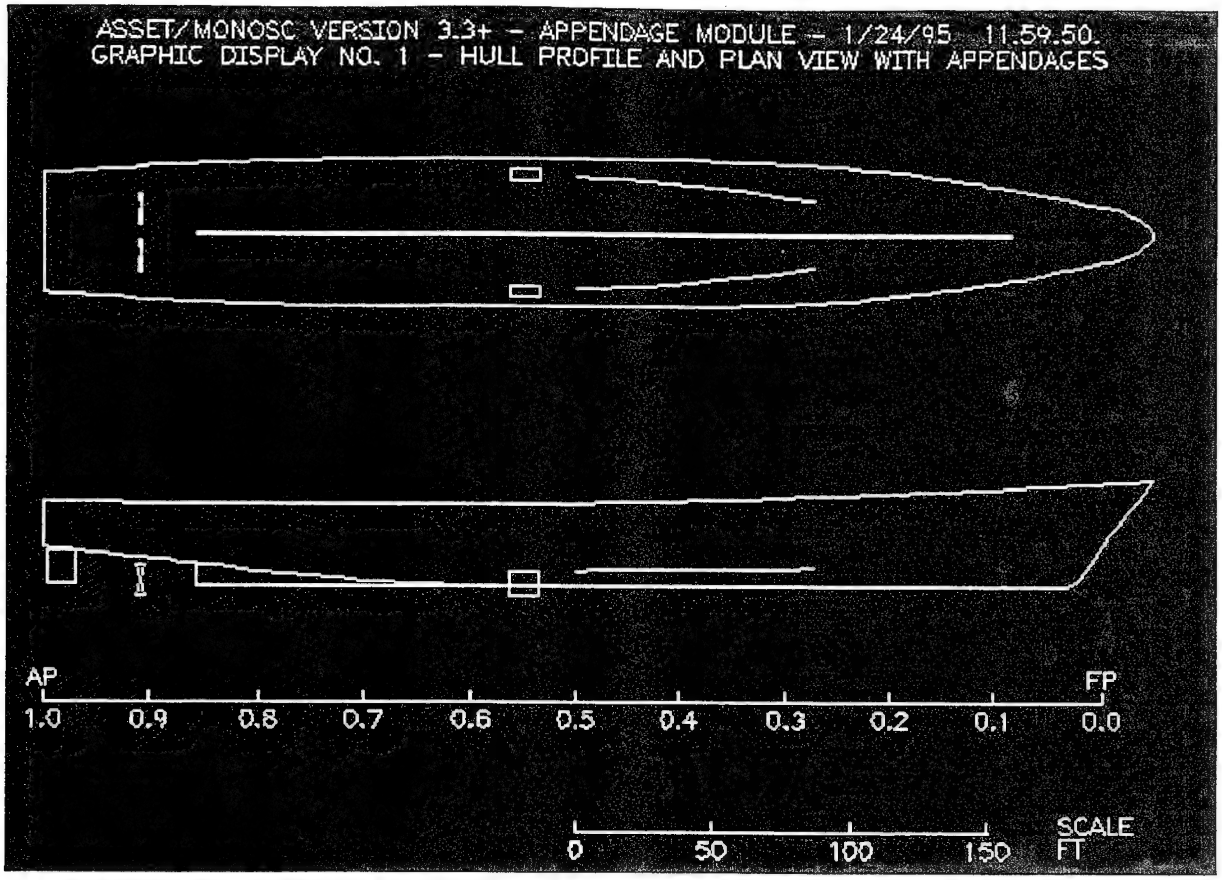
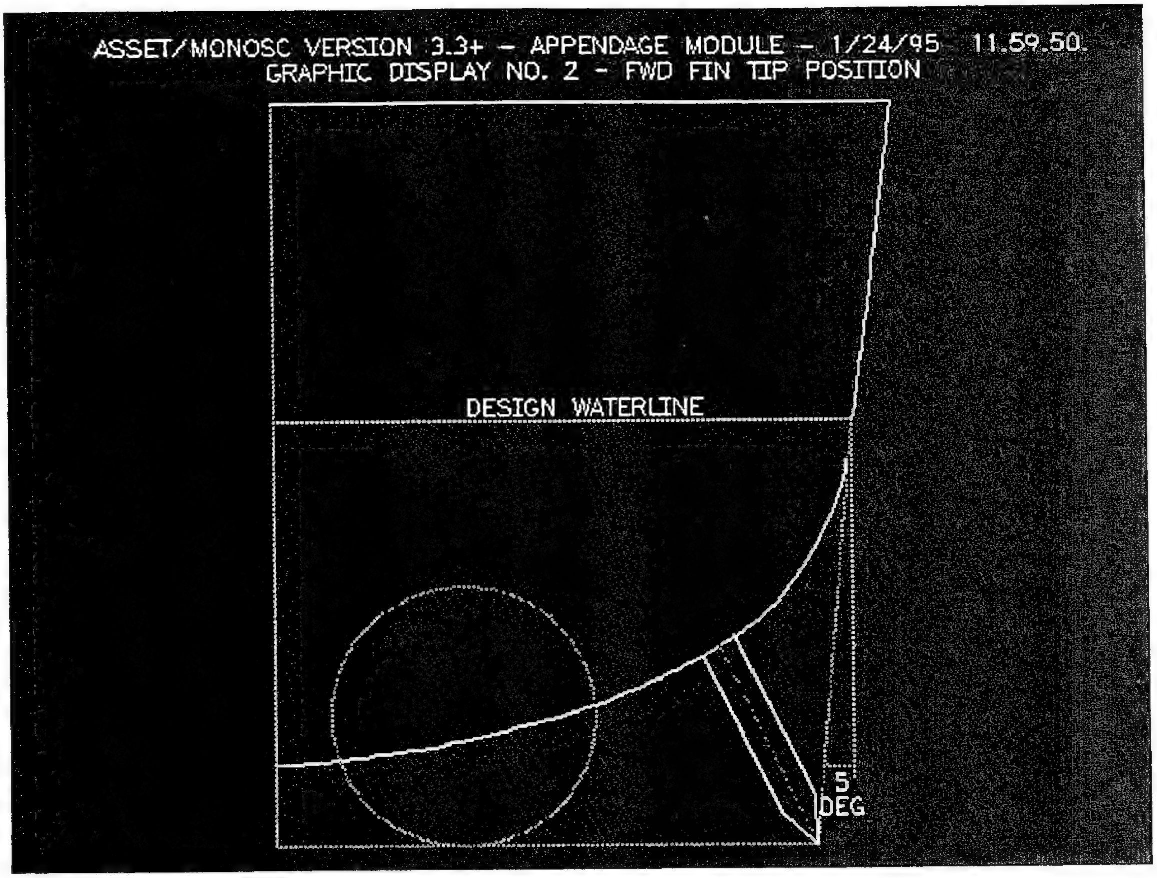
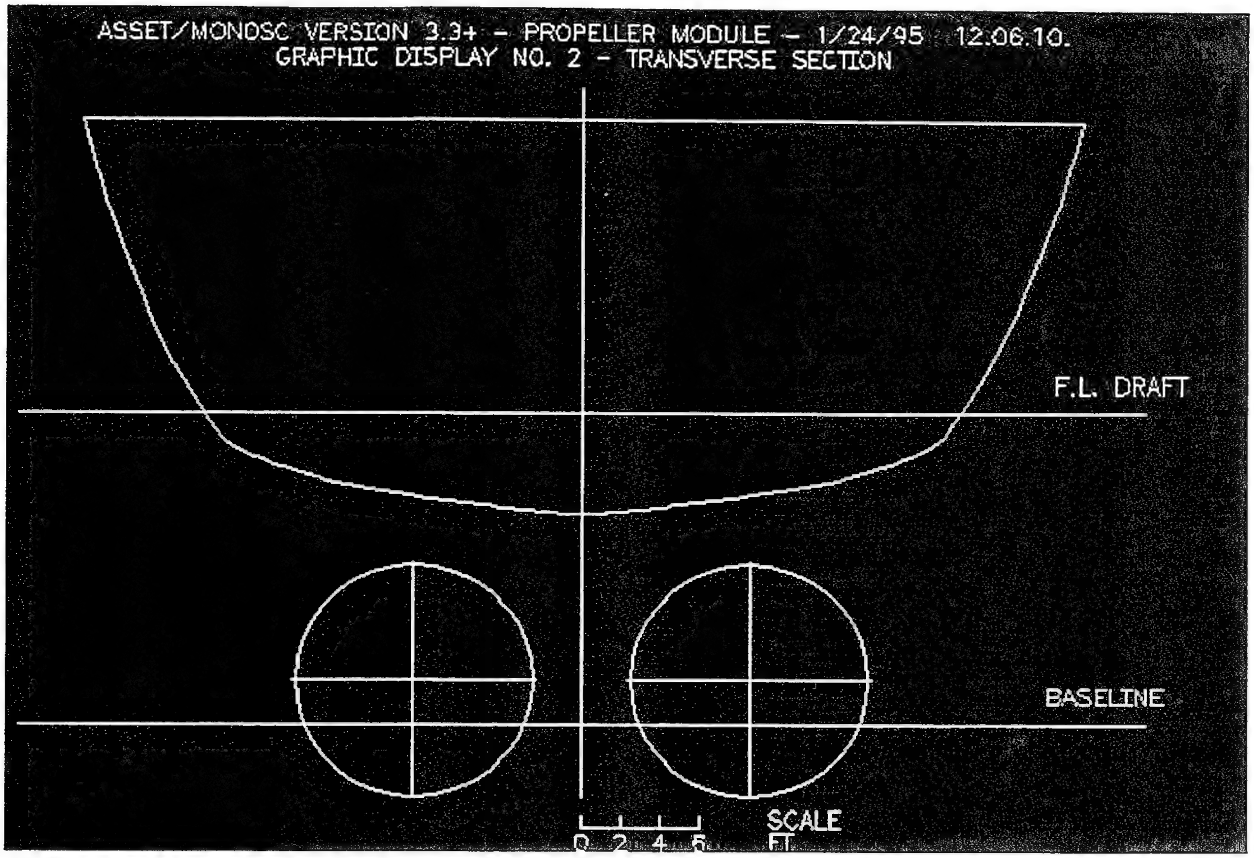
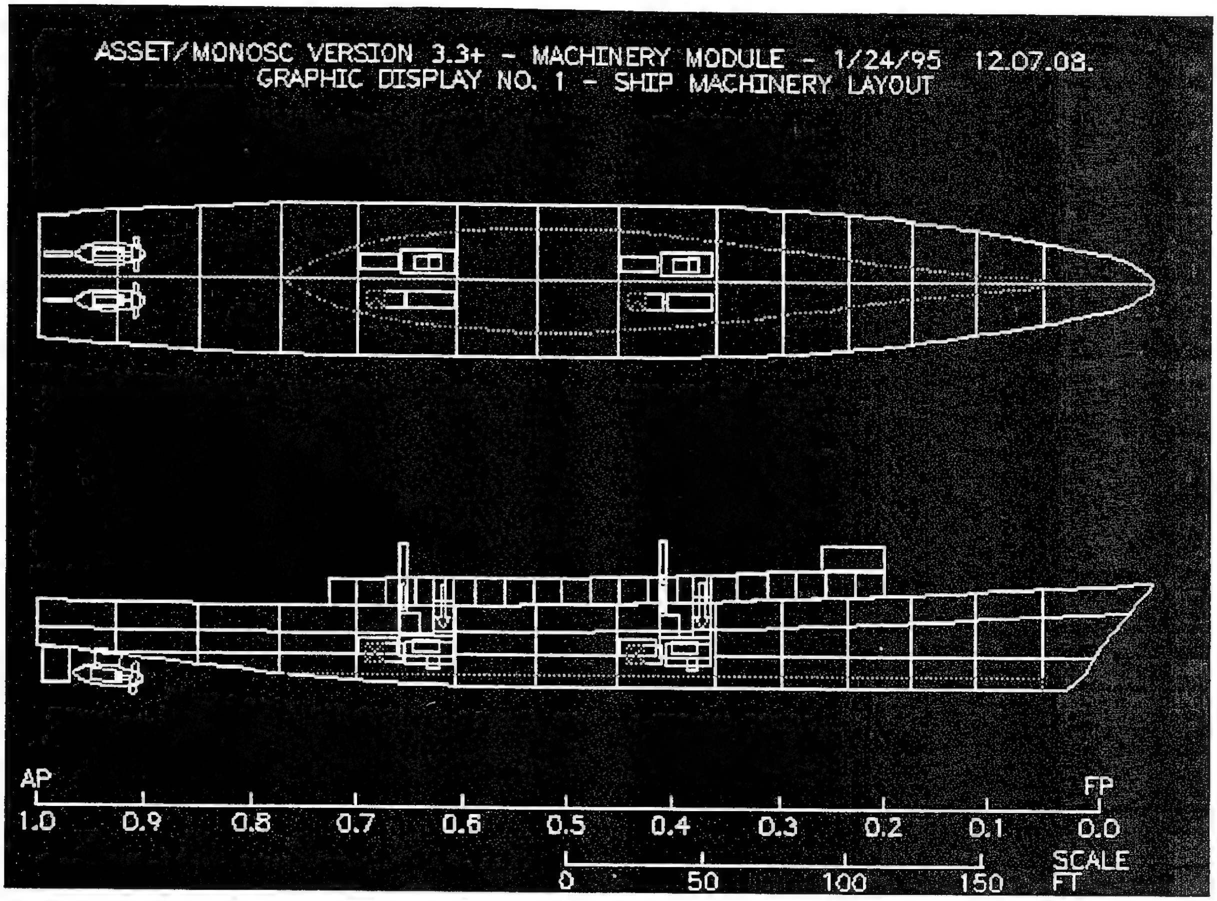
GRAPHIC DISPLAY NO. 1 - MIDSHIP SECTION
NEUTRAL
AXIS

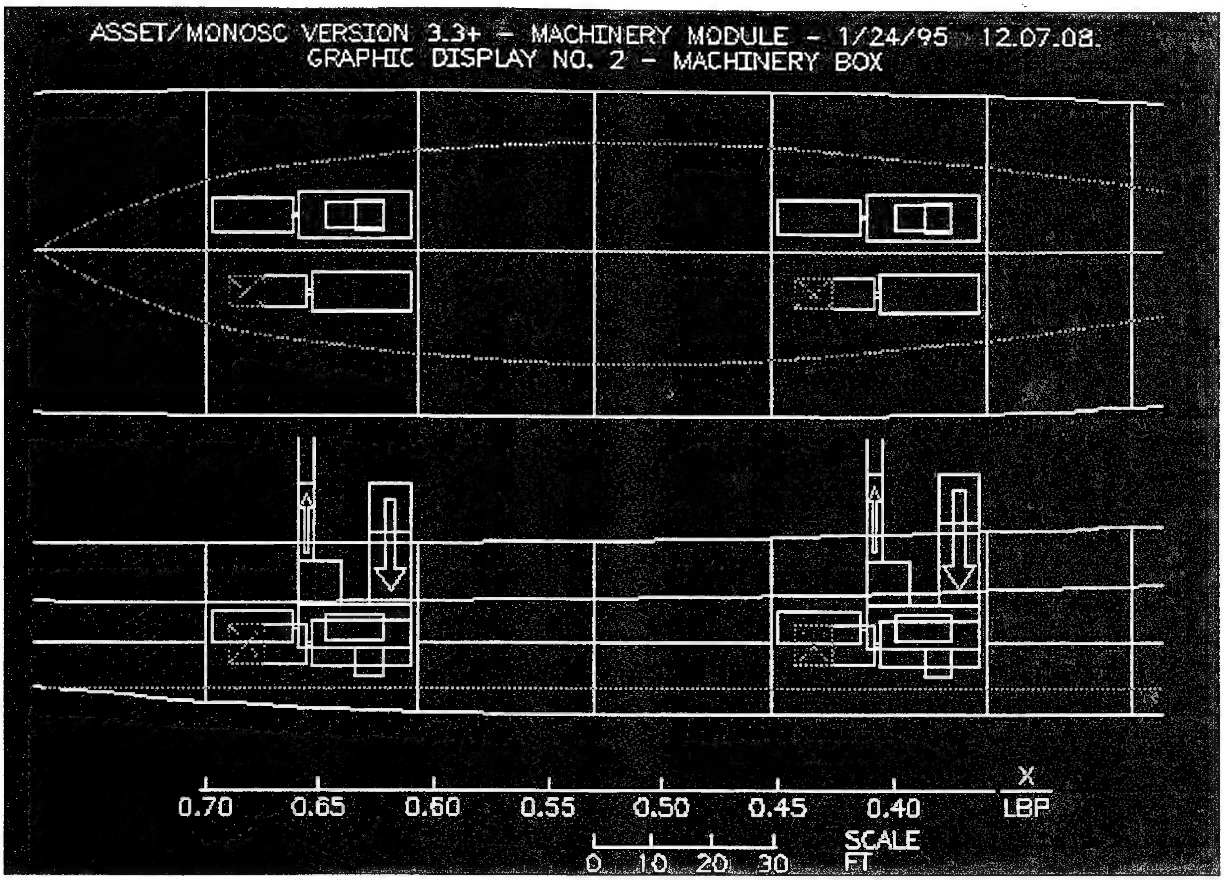

ASSET/MONOSC VERSION 3.3+ - HULL STRUCT MODULE - 1/24/95 11.57.39
GRAPHIC DISPLAY NO. 2 - SEGMENT NODE POINTS
WD 1
WD 2
WD 3
WD 4
SS 1
SS 2
ID 1
ID 2
ID 3
ID 4
SS 3
ID 1
ID 2
ID 3
SS 4
IB 5
IB 4
IB 3
IB 2
IB 1
BS 1
BS 2
BS 3
BS 4
BS 5
BS 6

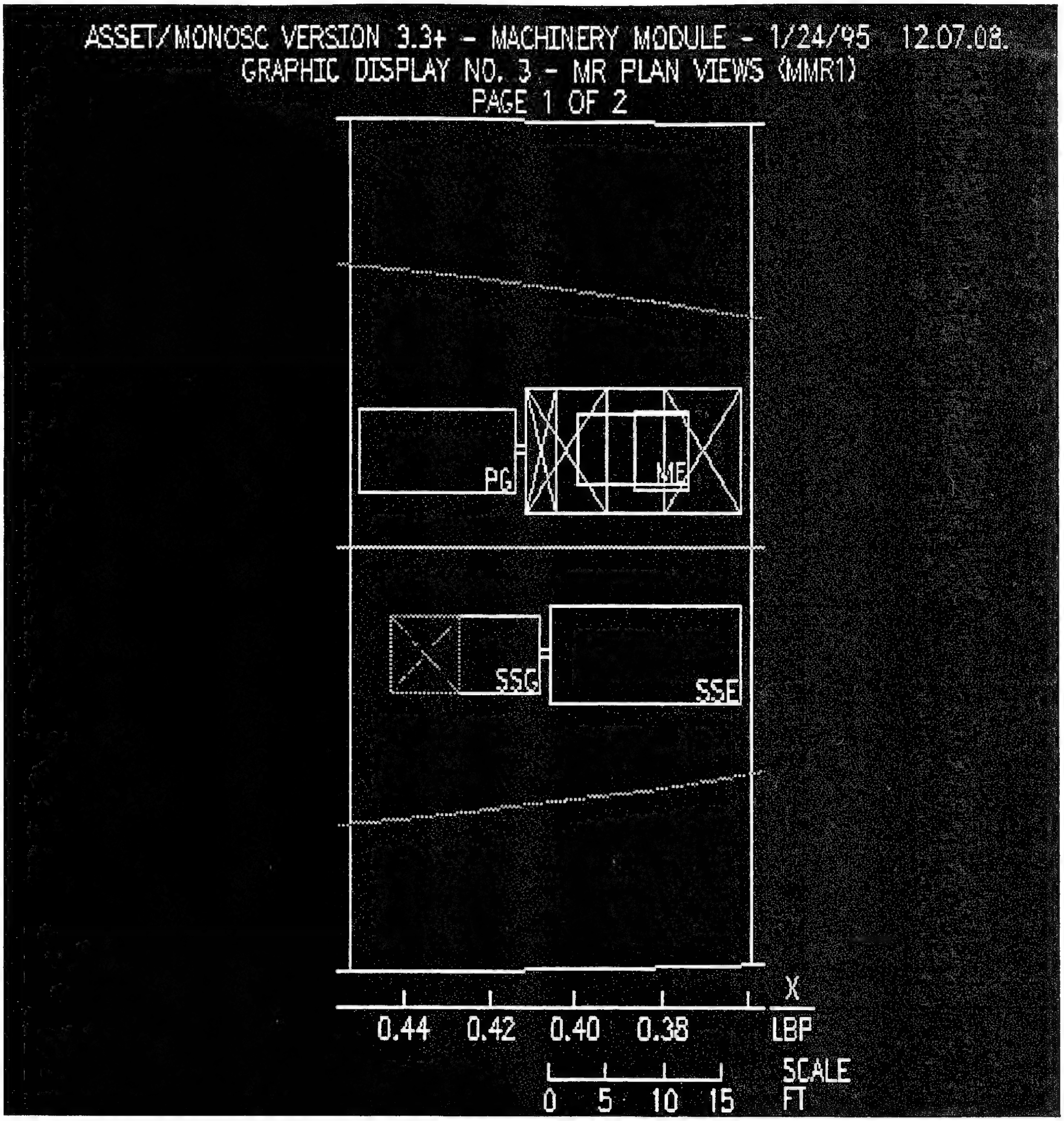

ASSET/MONOSC VERSION 3.3+ - APPENDAGE MODULE - 1/24/95 11.59.50.
GRAPHIC DISPLAY NO. 1 - HULL PROFILE AND PLAN VIEW WITH APPENDAGES
AP
FP
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
SCALE
FT

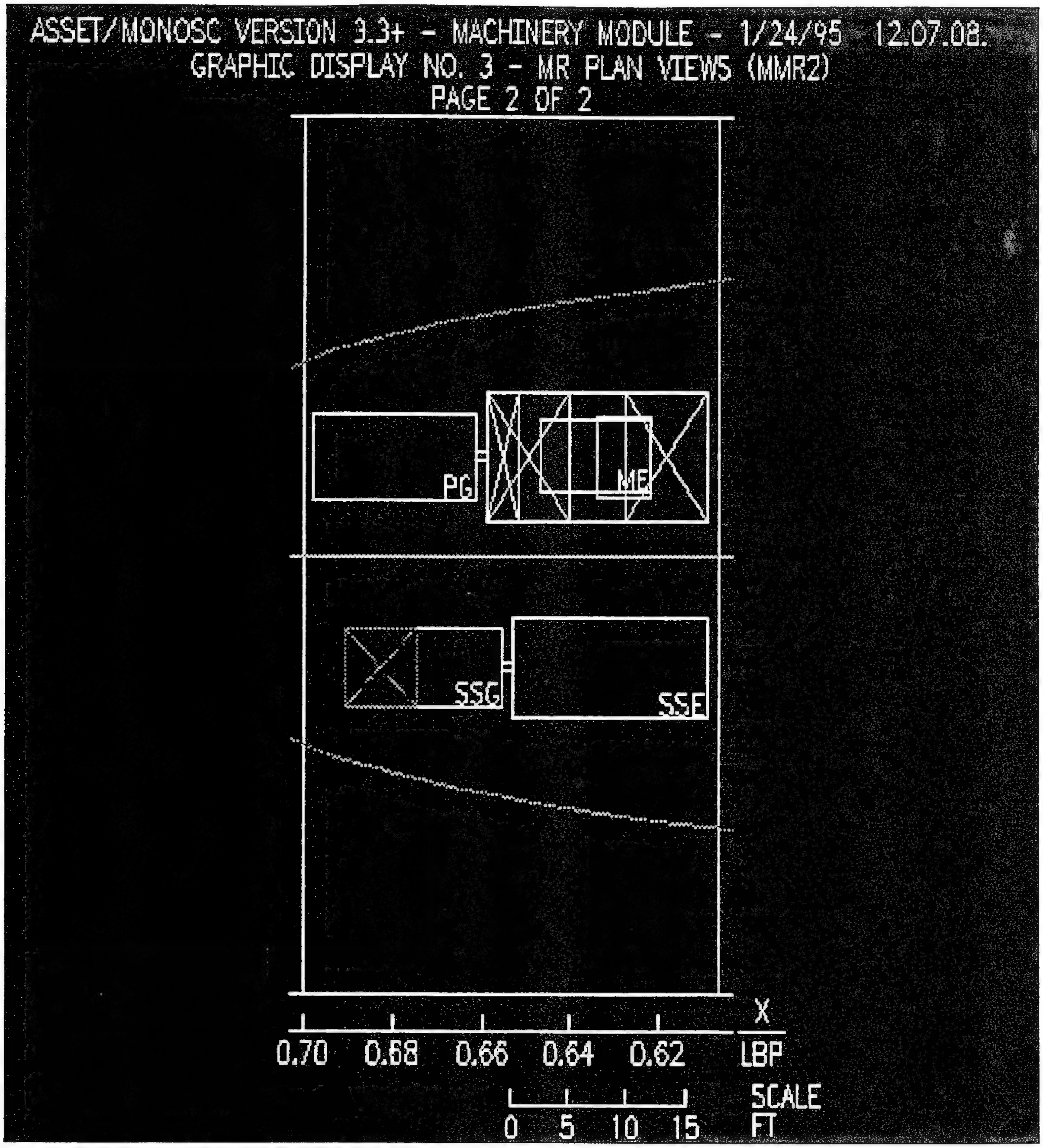

ASSET/MONOSC VERSION 3.3+ - APPENDAGE MODULE - 1/24/95 11.59.50.
GRAPHIC DISPLAY NO. 2 - FWD FIN TIP POSITION
DESIGN WATERLINE
5
DEG

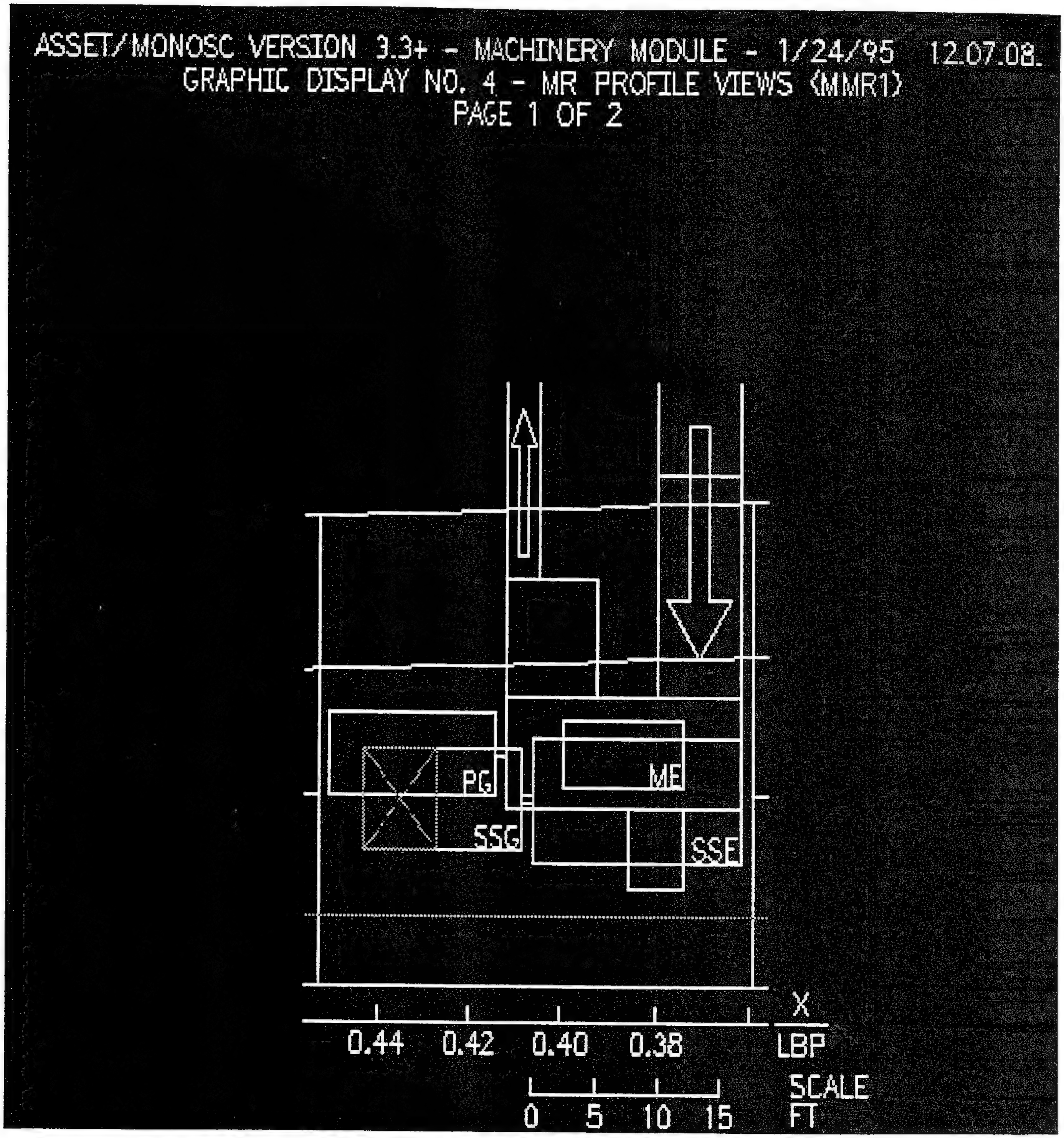

ASSET/MONOSC VERSION 3.3+ - PROPELLER MODULE - 1/24/95 12.06.10.
GRAPHIC DISPLAY NO. 2 - TRANSVERSE SECTION
F.L. DRAFT
BASELINE
SCALE
FT
0 2 4 6


ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 1/24/95 12.07.08.
GRAPHIC DISPLAY NO. 1 - SHIP MACHINERY LAYOUT
AP
FP
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0
0 50 100 150
SCALE
FT

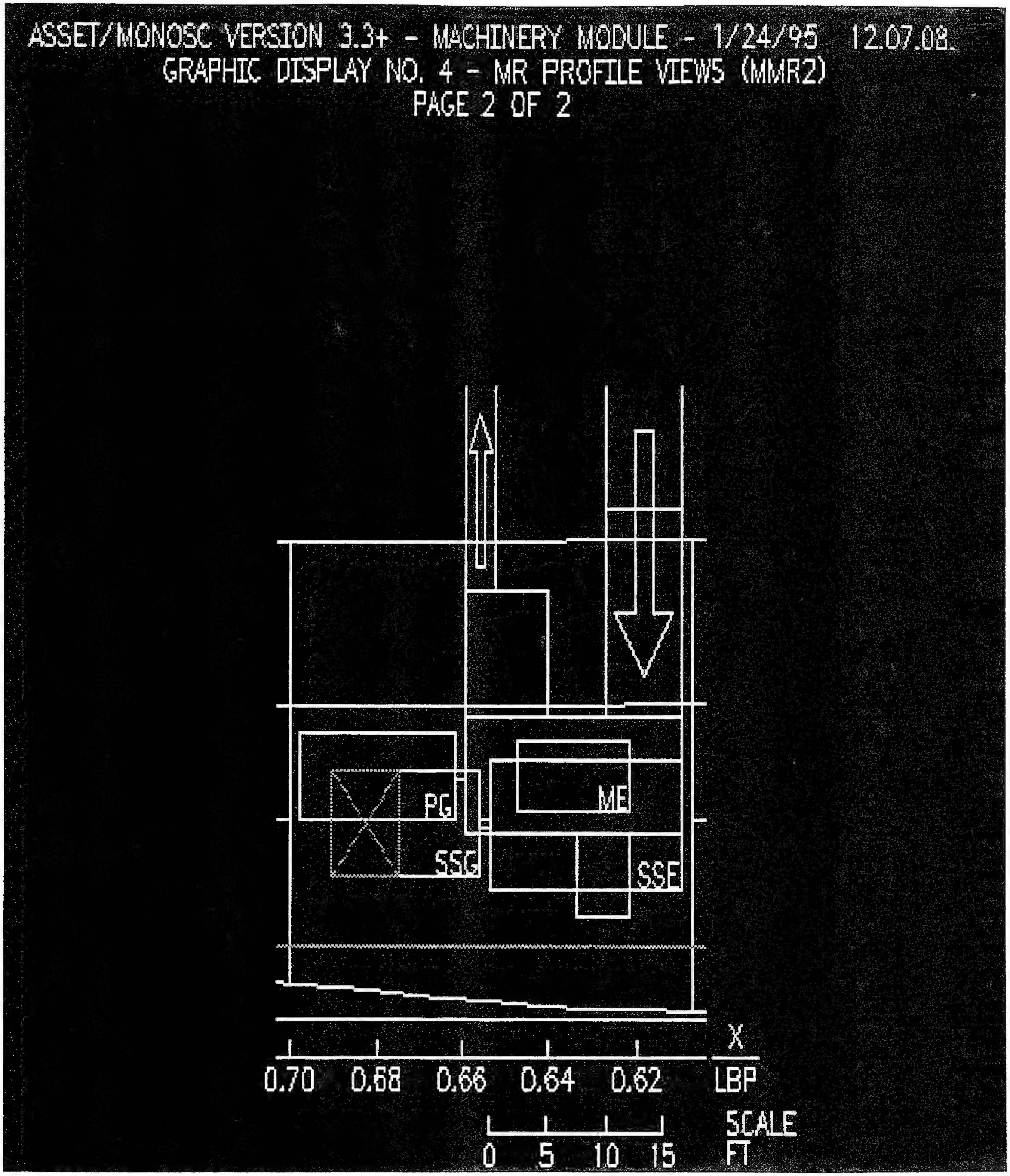

ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 1/24/95 12.07.08.
GRAPHIC DISPLAY NO. 2 - MACHINERY BOX
0.70
0.65
0.60
0.55
0.50
0.45
0.40
X
LBP
SCALE
FT
0
10
20
30

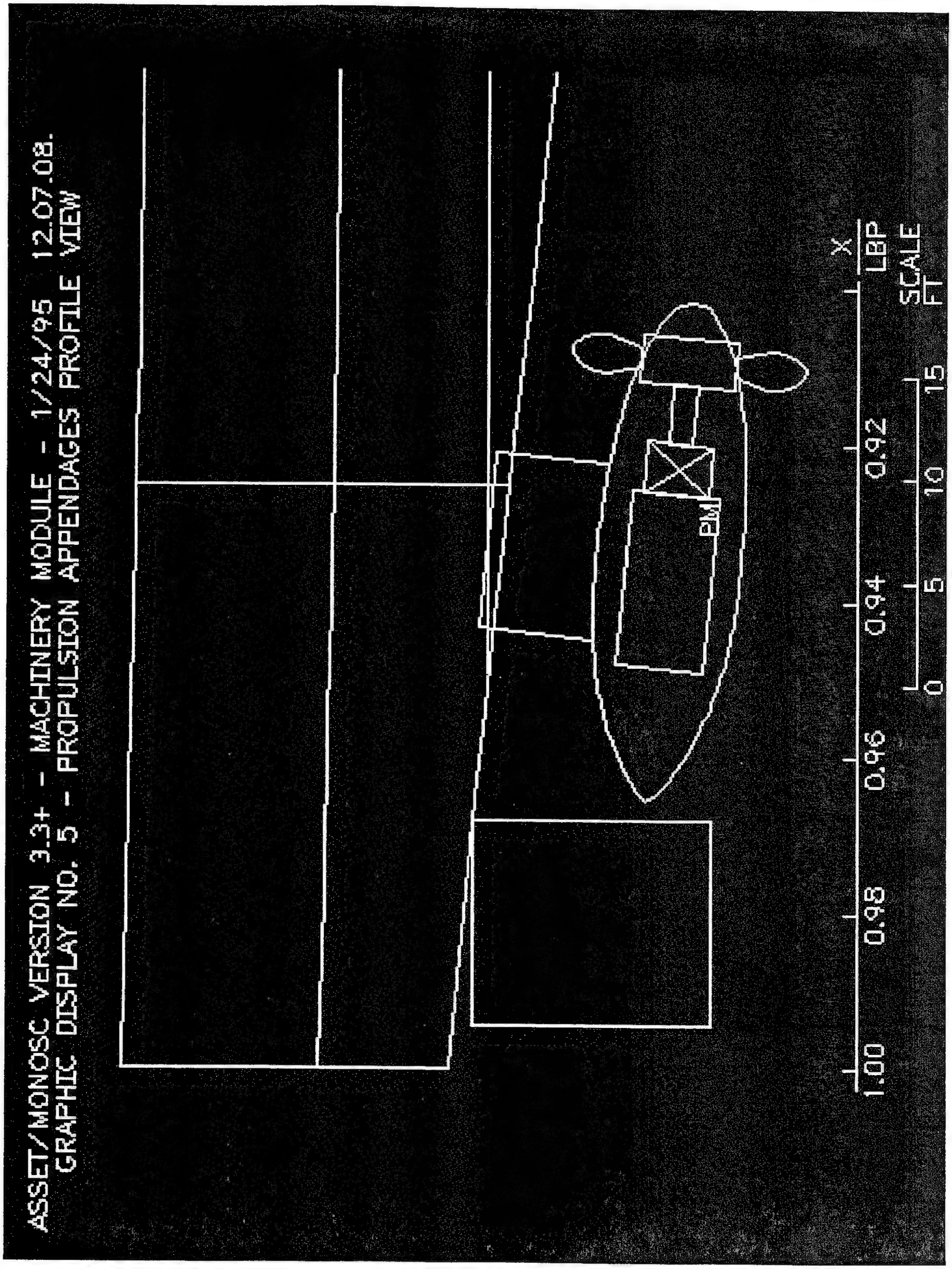

ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 1/24/95 12.07.08.
GRAPHIC DISPLAY NO. 3 - MR PLAN VIEWS (MMR1)
PAGE 1 OF 2
PG
ME
SSG
SSE
X
0.44
0.42
0.40
0.38
LBP
SCALE
0
5
10
15
FT


ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 1/24/95 12.07.08.
GRAPHIC DISPLAY NO. 3 - MR PLAN VIEWS (MMR2)
PAGE 2 OF 2
PG
ME
SSG
SSE
X
LBP
0.70
0.68
0.66
0.64
0.62
SCALE
FT
0
5
10
15



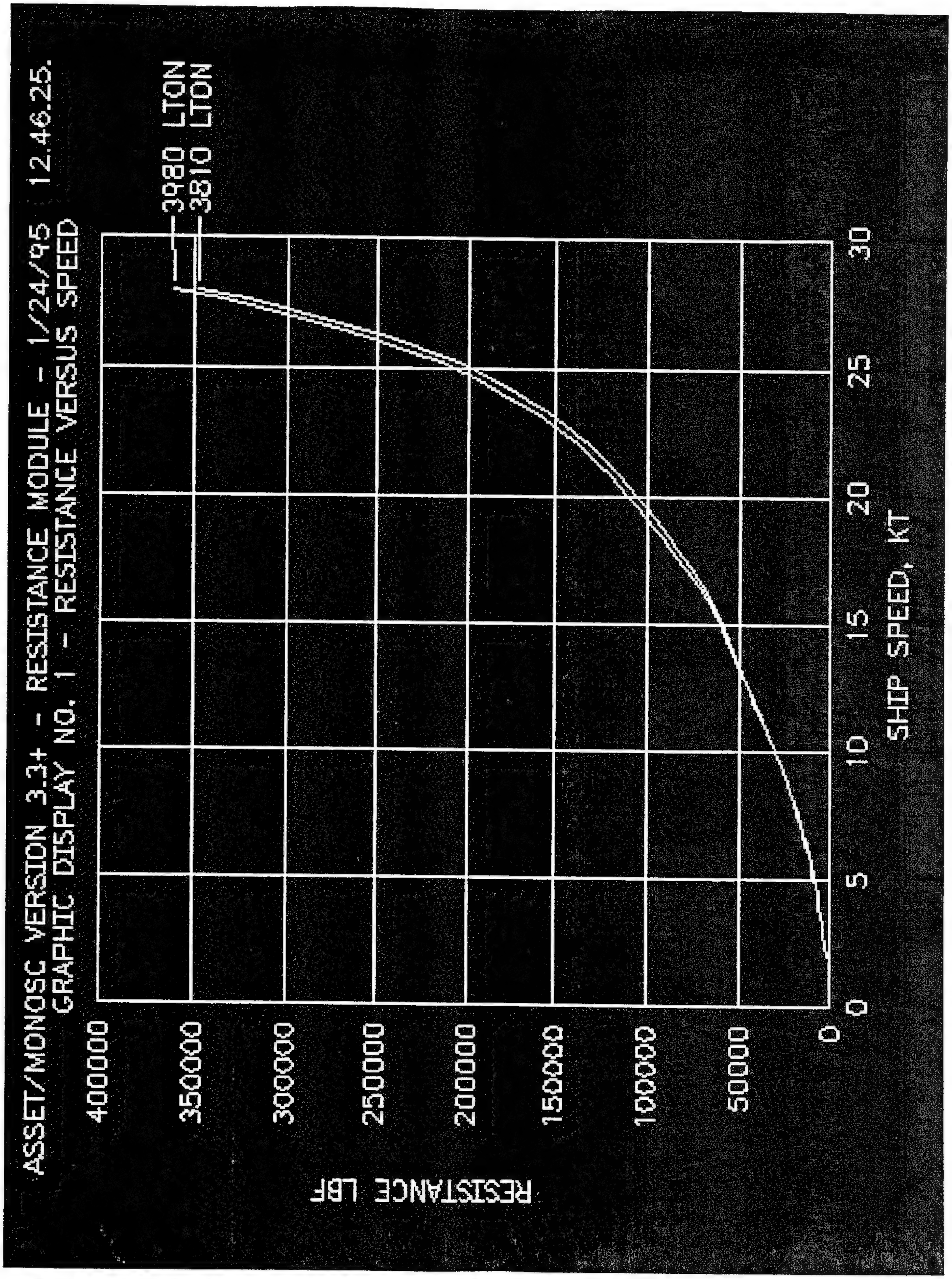
ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 1/24/95 12.07.08.
GRAPHIC DISPLAY NO. 4 - MR PROFILE VIEWS (MMR1)
PAGE 1 OF 2
PG
ME
SSG
SSE
X
0.44
0.42
0.40
0.38
LBP
SCALE
FT
0
5
10
15

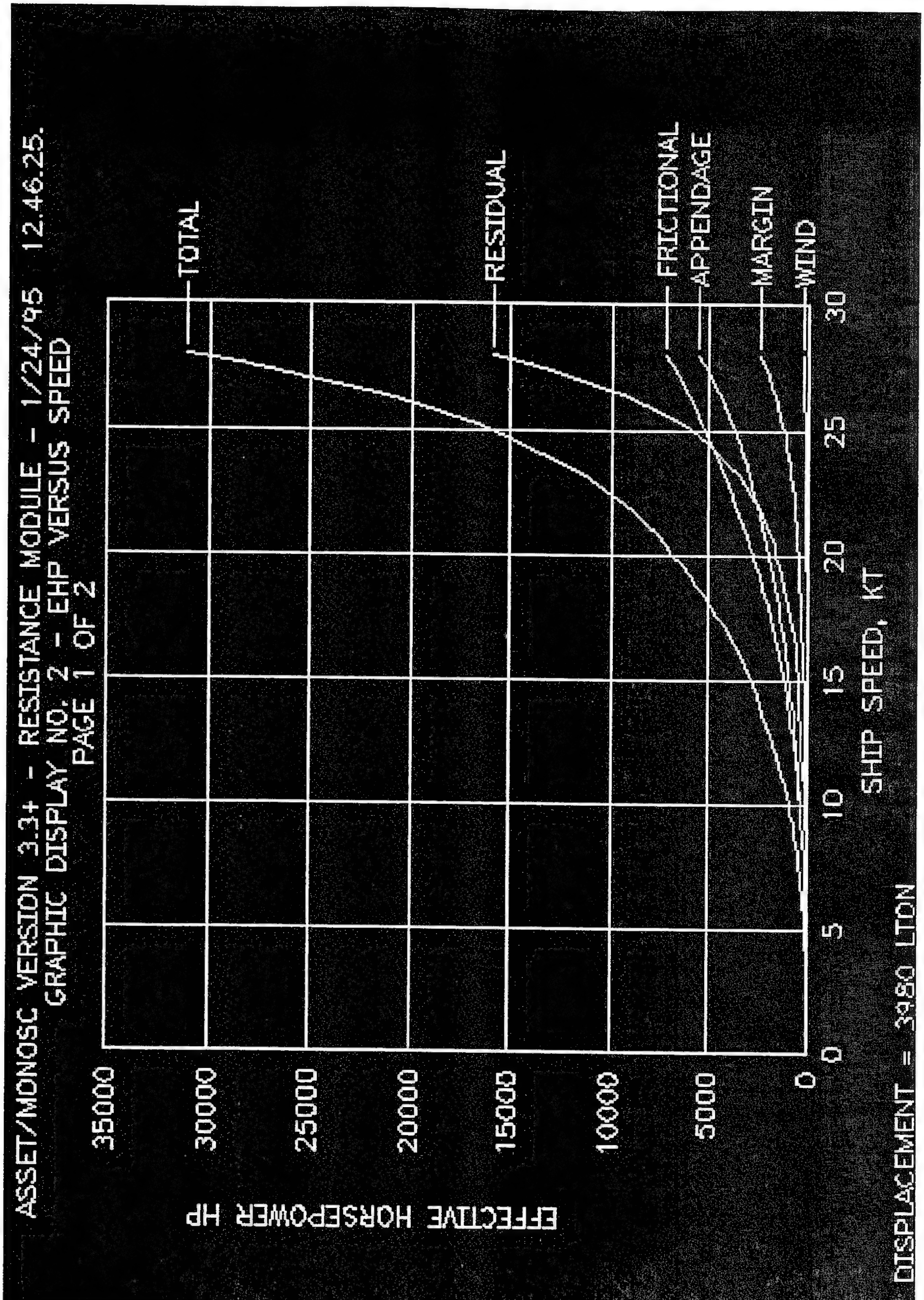

ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 1/24/95 12.07.08.
GRAPHIC DISPLAY NO. 4 - MR PROFILE VIEWS (MMR2)
PAGE 2 OF 2
PG
ME
SSG
SSE
X
0.70
0.68
0.66
0.64
0.62
LBP
SCALE
FT
0
5
10
15

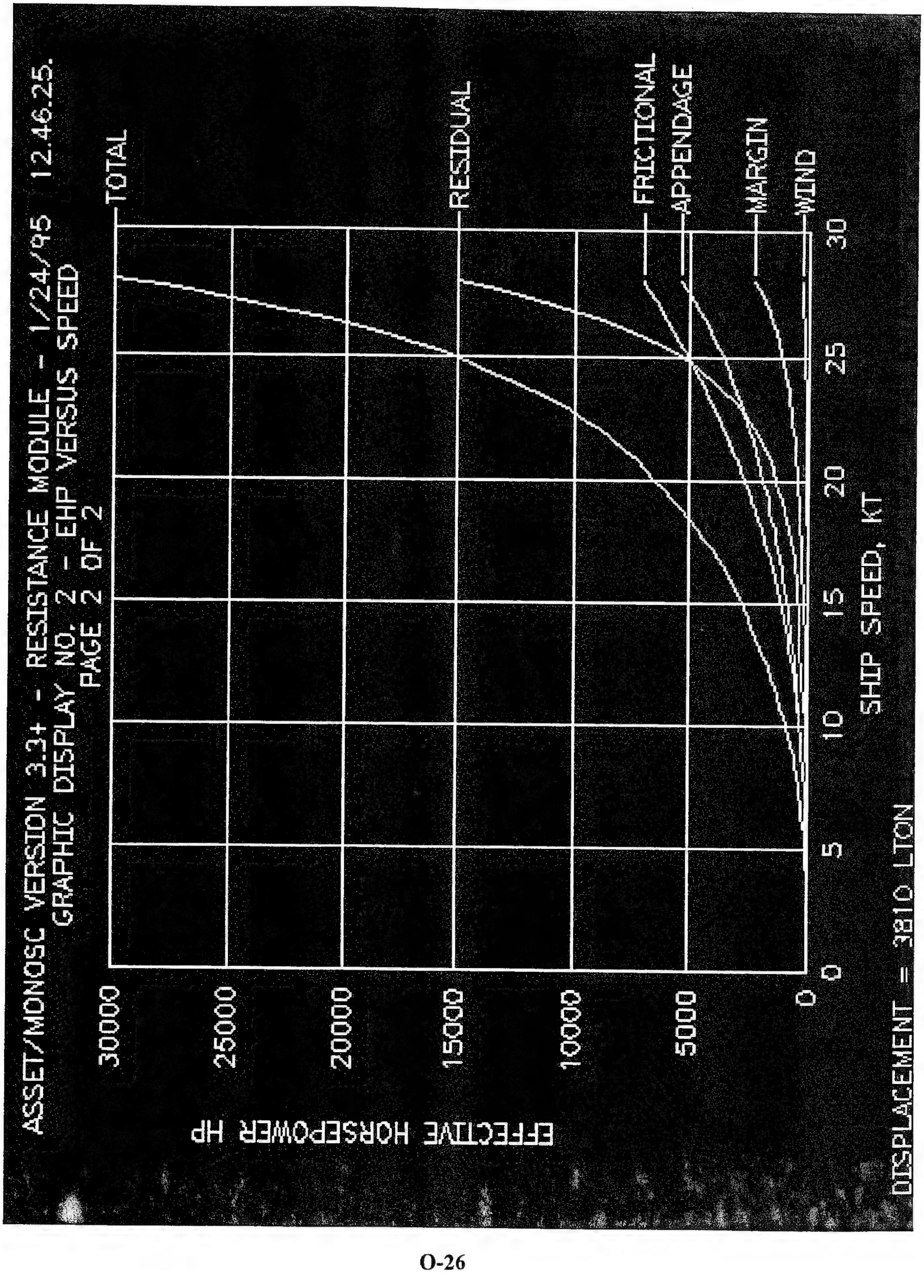

ASSET/MONOSC VERSION 3.3+ - MACHINERY MODULE - 1/24/95 12.07.08.
GRAPHIC DISPLAY NO. 5 - PROPULSION APPENDAGES PROFILE VIEW
PM
X/LBP
1.00
0.98
0.96
0.94
0.92
SCALE FT
0
5
10
15

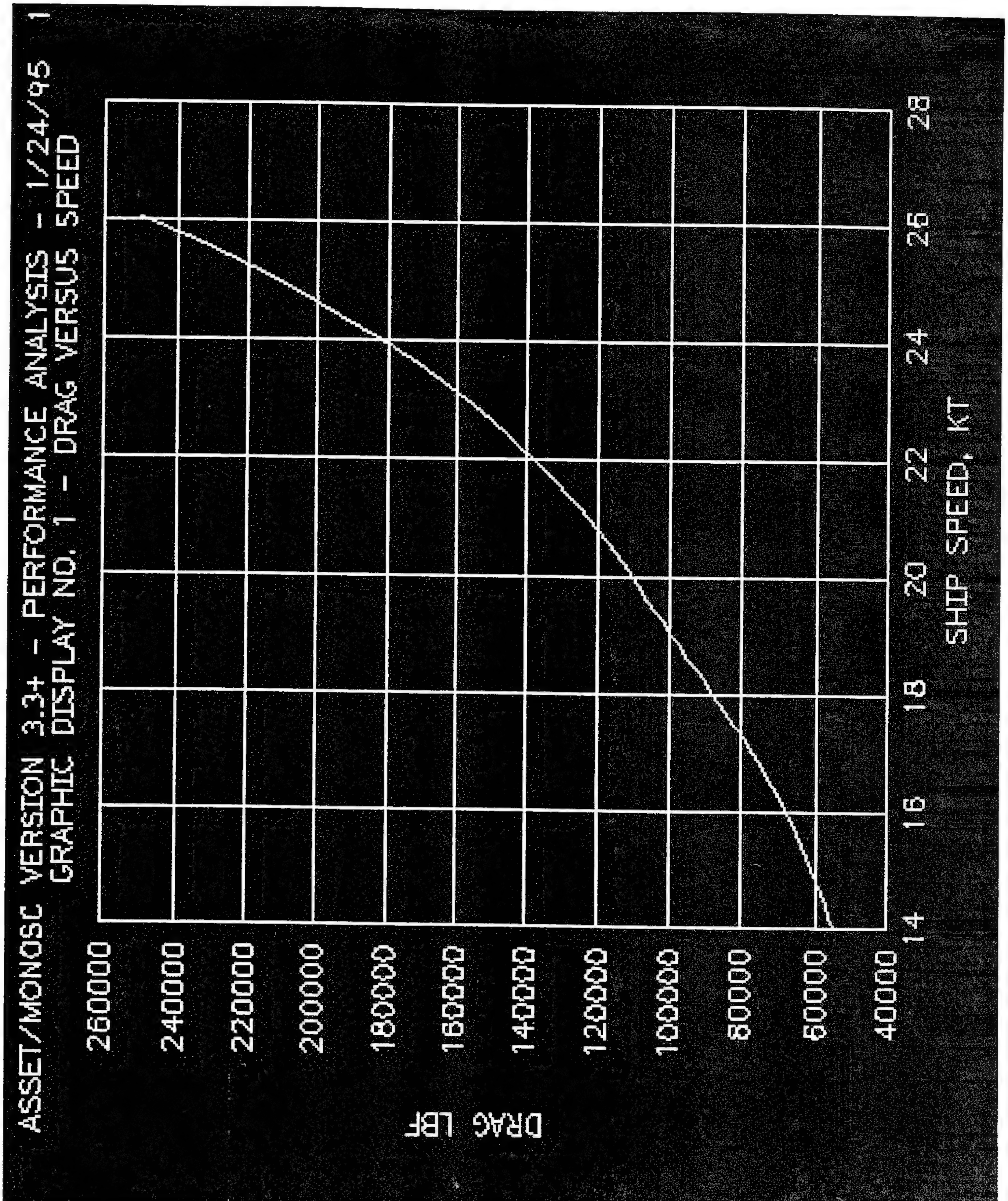
SECTION 2

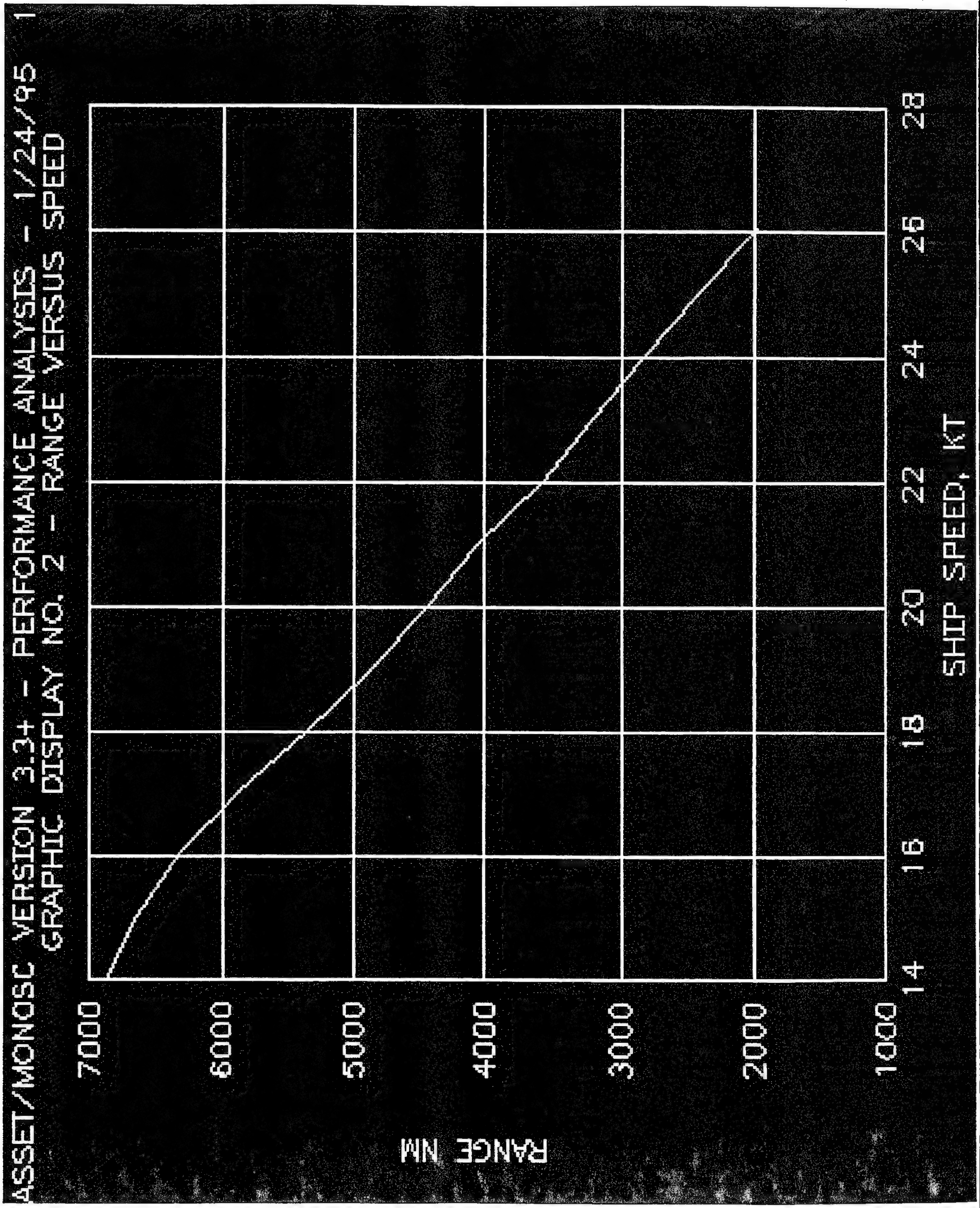
NAVY VARIANT SPECIFIC REPORTS

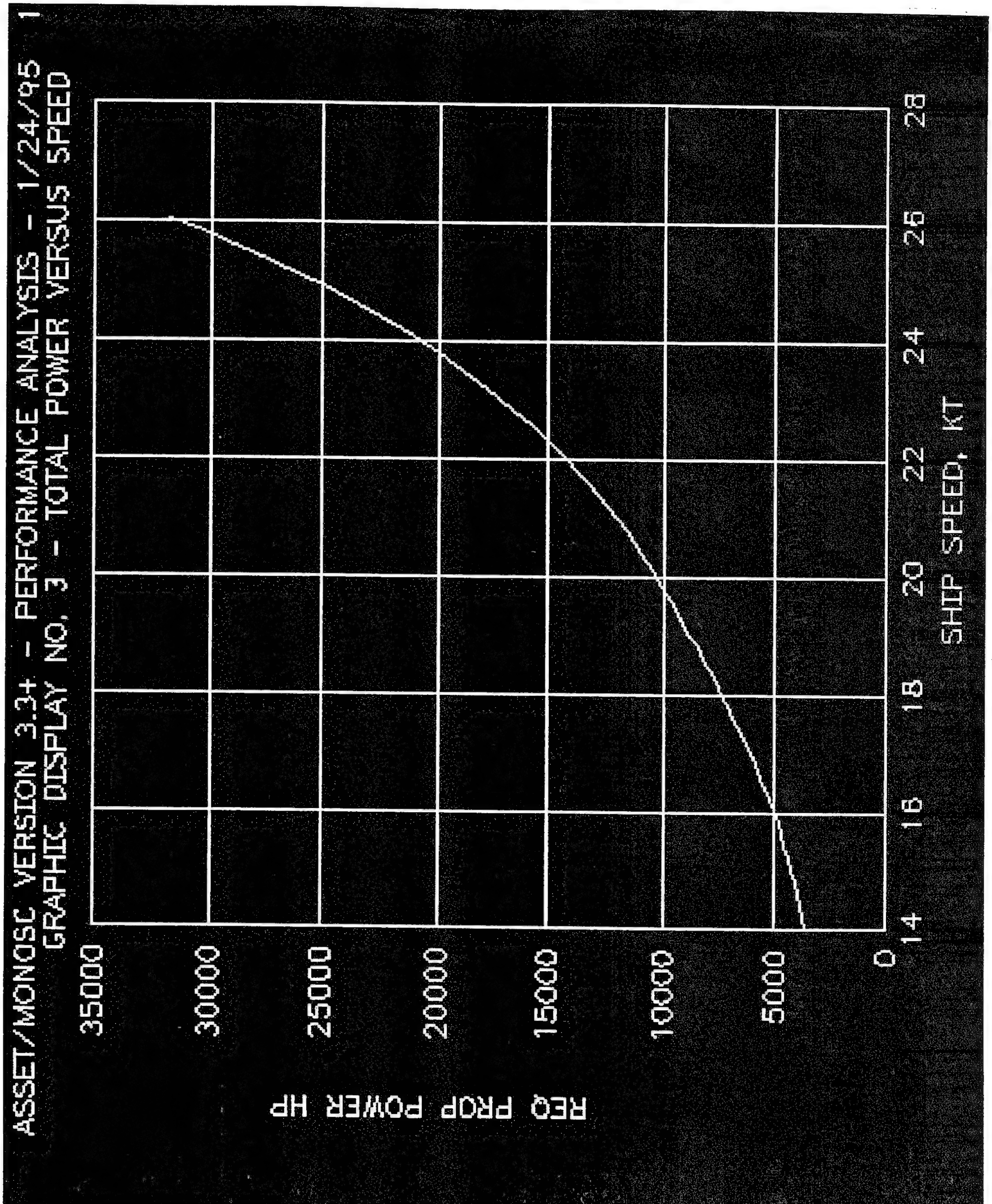

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 1/24/95 12.46.25.
GRAPHIC DISPLAY NO. 1 - RESISTANCE VERSUS SPEED
3980 LTON
3810 LTON
400000
350000
300000
250000
200000
150000
100000
50000
0
RESISTANCE LBF
0
5
10
15
20
25
30
SHIP SPEED, KT

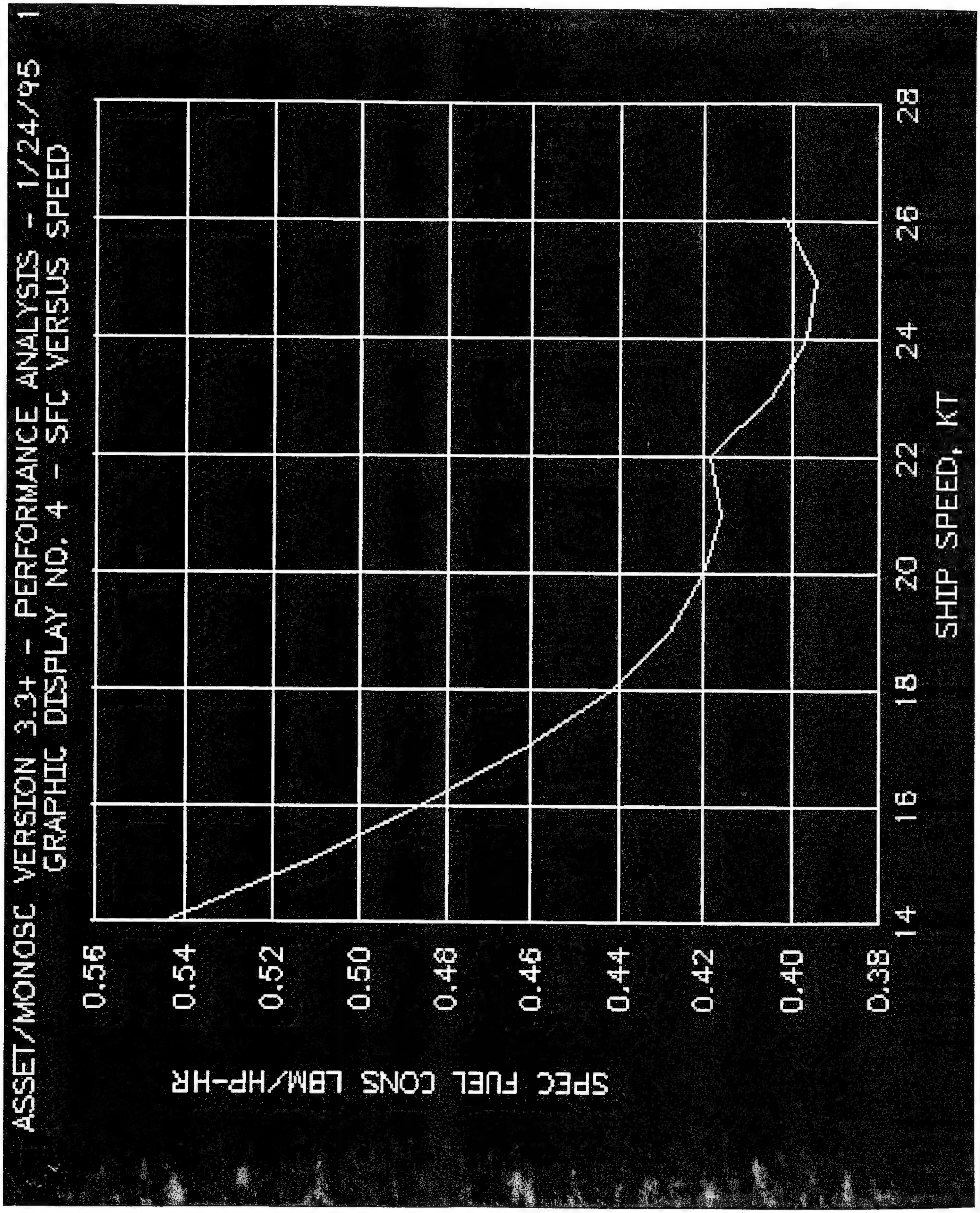

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 1/24/95 12.46.25.
GRAPHIC DISPLAY NO. 2 - EHP VERSUS SPEED
PAGE 1 OF 2
EFFECTIVE HORSEPOWER HP
35000
30000
25000
20000
15000
10000
5000
0
0
5
10
15
20
25
30
SHIP SPEED, KT
TOTAL
RESIDUAL
FRICTIONAL
APPENDAGE
MARGIN
WIND
DISPLACEMENT = 3980 LTON

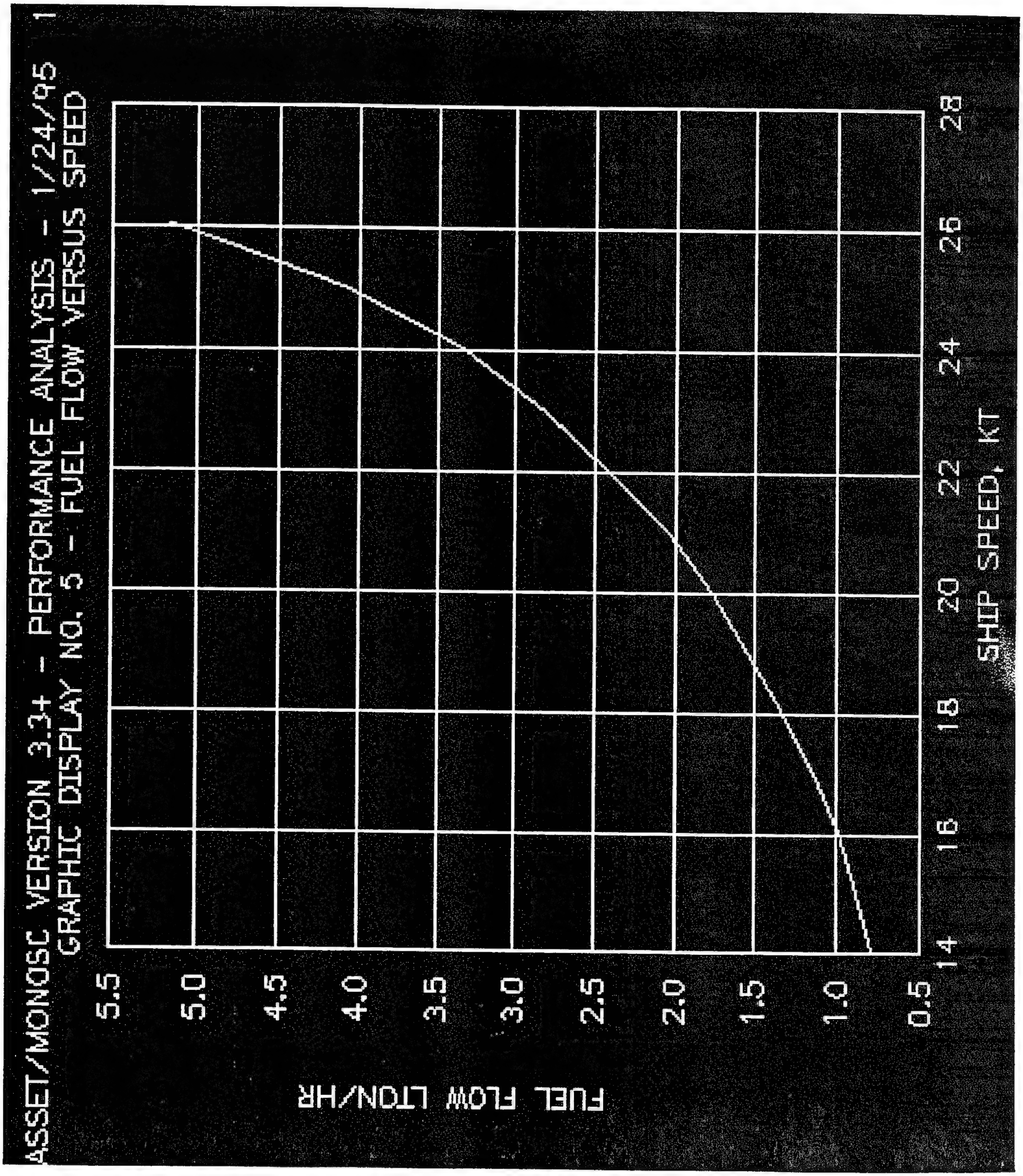

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 1/24/95 12.46.25.
GRAPHIC DISPLAY NO. 2 - EHP VERSUS SPEED
PAGE 2 OF 2
TOTAL
RESIDUAL
FRICTIONAL
APPENDAGE
MARGIN
WIND
EFFECTIVE HORSEPOWER HP
30000
25000
20000
15000
10000
5000
0
0
5
10
15
20
25
30
SHIP SPEED, KT
DISPLACEMENT = 3810 LTON

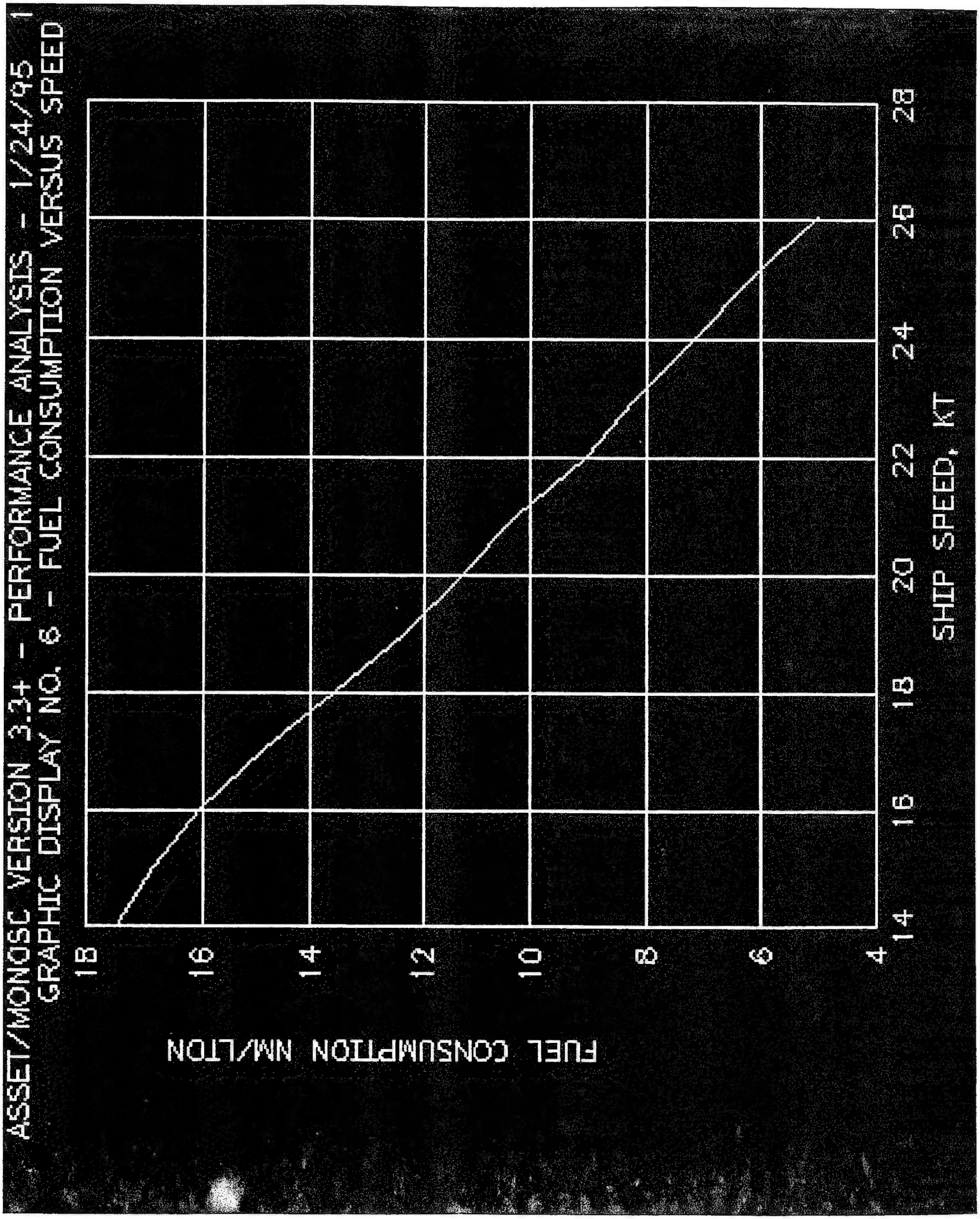

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 1 - DRAG VERSUS SPEED
DRAG LBF
260000
240000
220000
200000
180000
160000
140000
120000
100000
80000
60000
40000
14
16
18
20
22
24
26
28
SHIP SPEED, KT

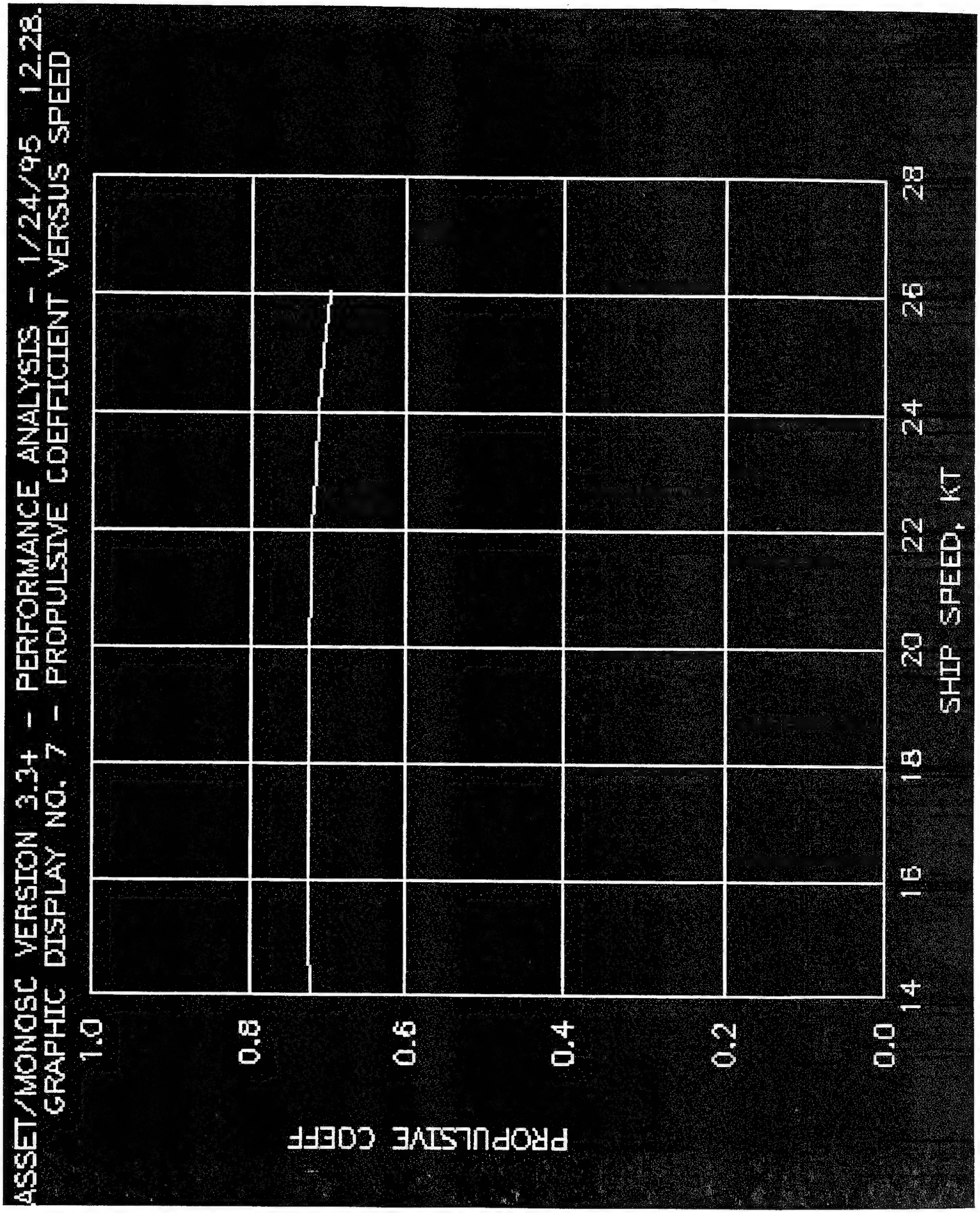

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 2 - RANGE VERSUS SPEED
RANGE NM
7000
6000
5000
4000
3000
2000
1000
14
16
18
20
22
24
26
28
SHIP SPEED, KT

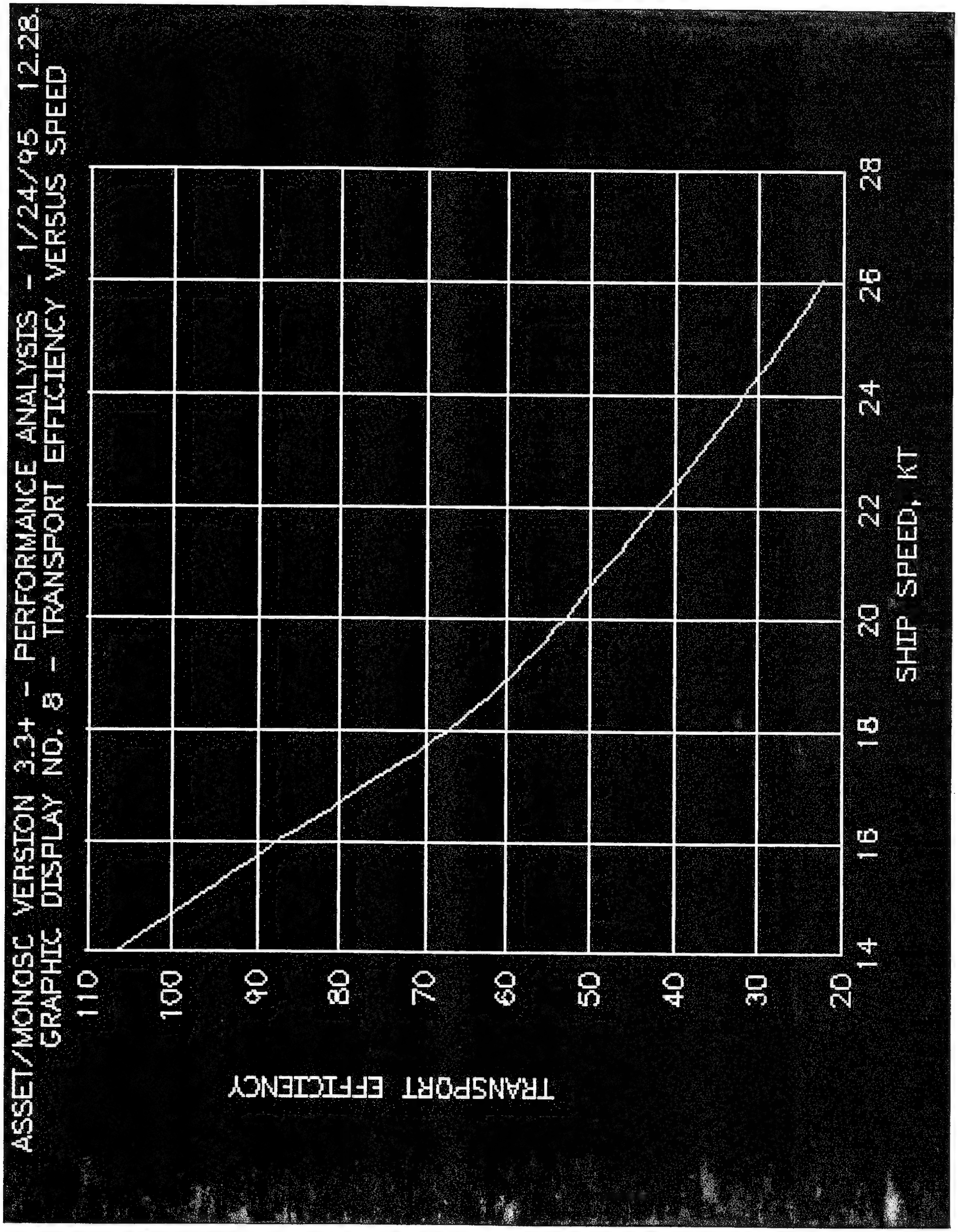

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 3 - TOTAL POWER VERSUS SPEED
REQ PROP POWER HP
35000
30000
25000
20000
15000
10000
5000
0
14
16
18
20
22
24
26
28
SHIP SPEED, KT

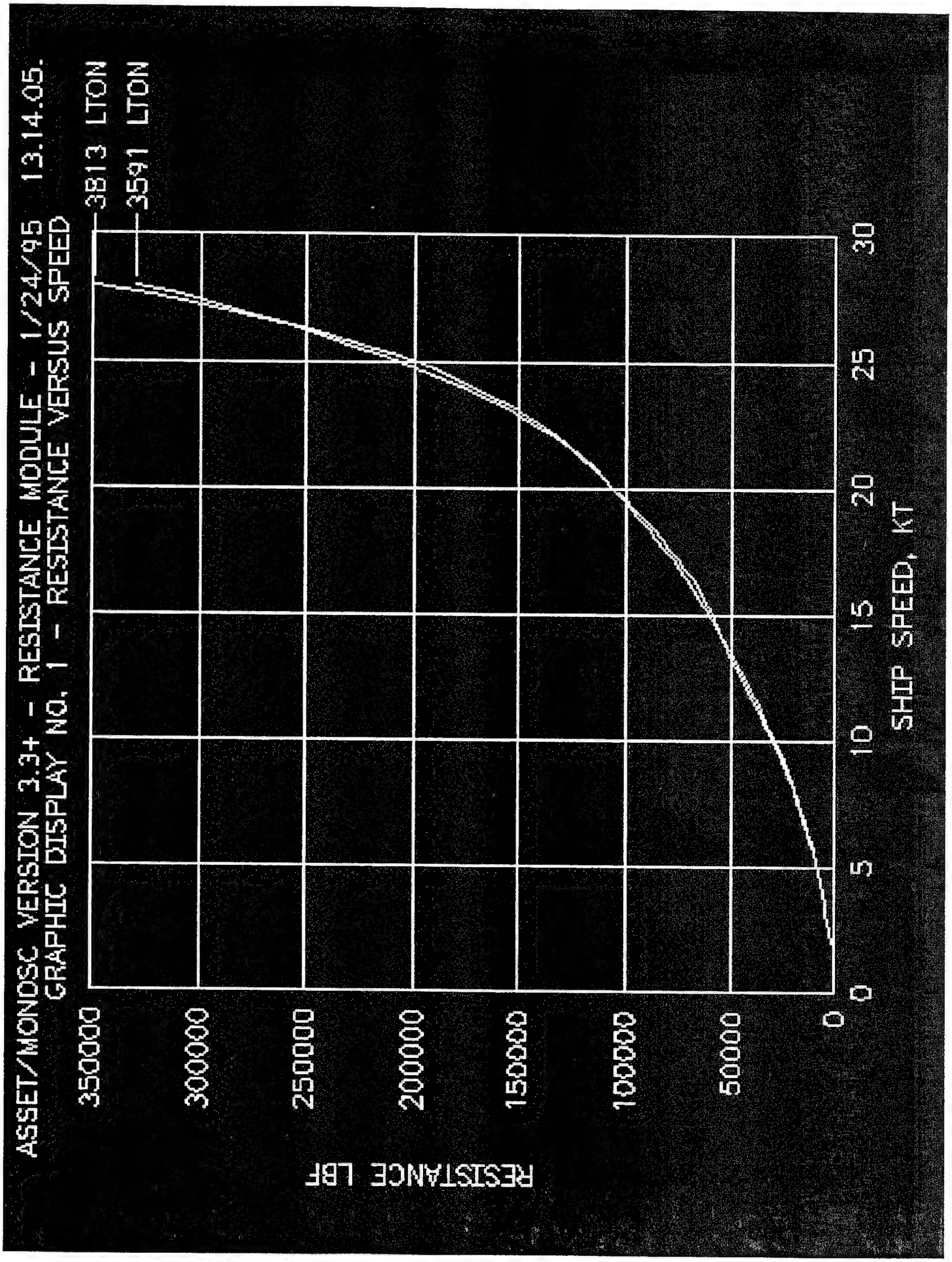

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 4 - SFC VERSUS SPEED
SPEC FUEL CONS LBM/HP-HR
0.56
0.54
0.52
0.50
0.48
0.46
0.44
0.42
0.40
0.38
SHIP SPEED, KT
14
16
18
20
22
24
26
28


ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 5 - FUEL FLOW VERSUS SPEED
FUEL FLOW LTON/HR
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
14
16
18
20
22
24
26
28
SHIP SPEED, KT


ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 6 - FUEL CONSUMPTION VERSUS SPEED
FUEL CONSUMPTION NM/LTON
4
6
8
10
12
14
16
18
SHIP SPEED, KT
14
16
18
20
22
24
26
28

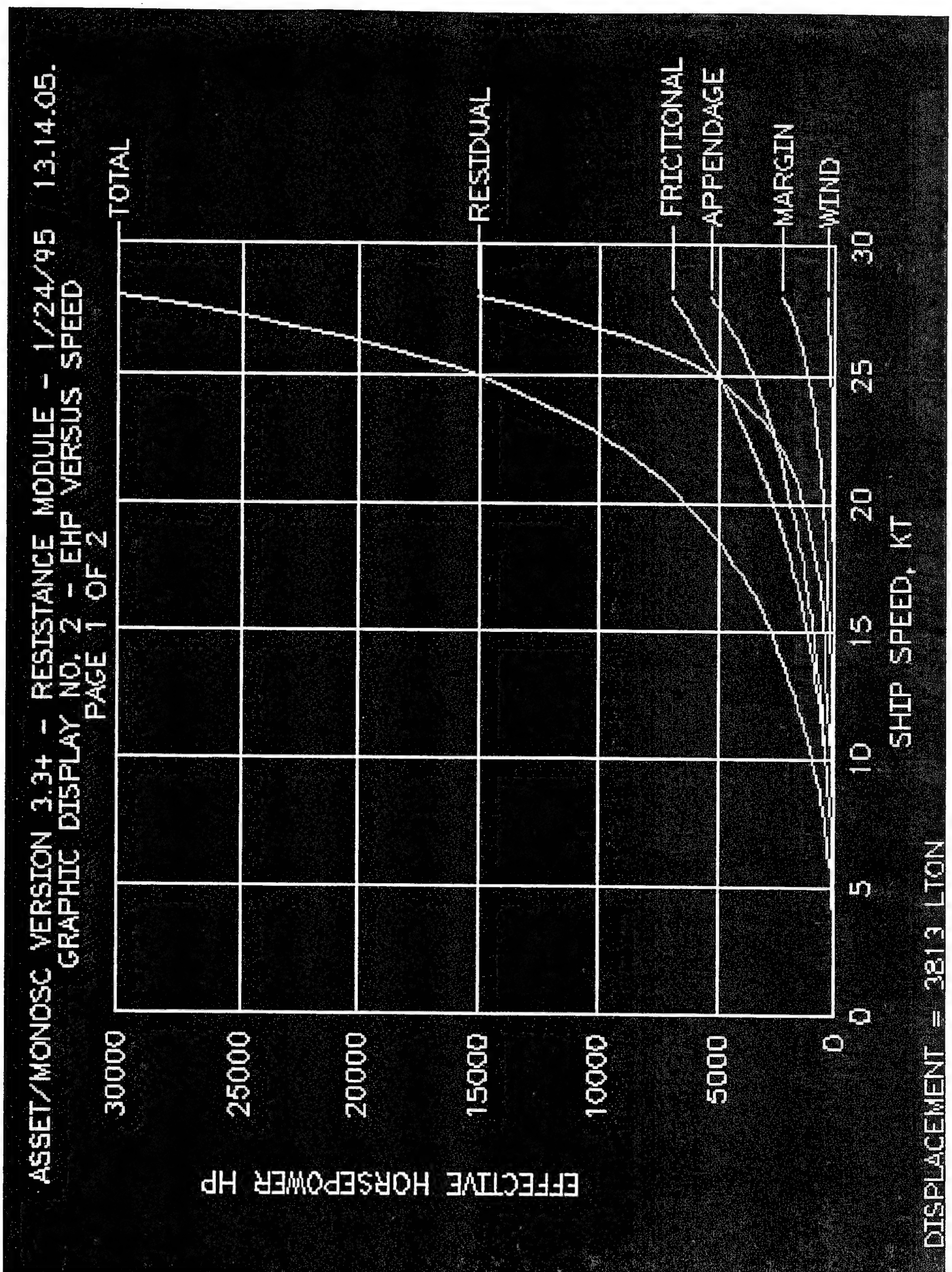

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 12.28.
GRAPHIC DISPLAY NO. 7 - PROPULSIVE COEFFICIENT VERSUS SPEED
PROPULSIVE COEFF
0.0
0.2
0.4
0.6
0.8
1.0
14
16
18
20
22
24
26
28
SHIP SPEED, KT

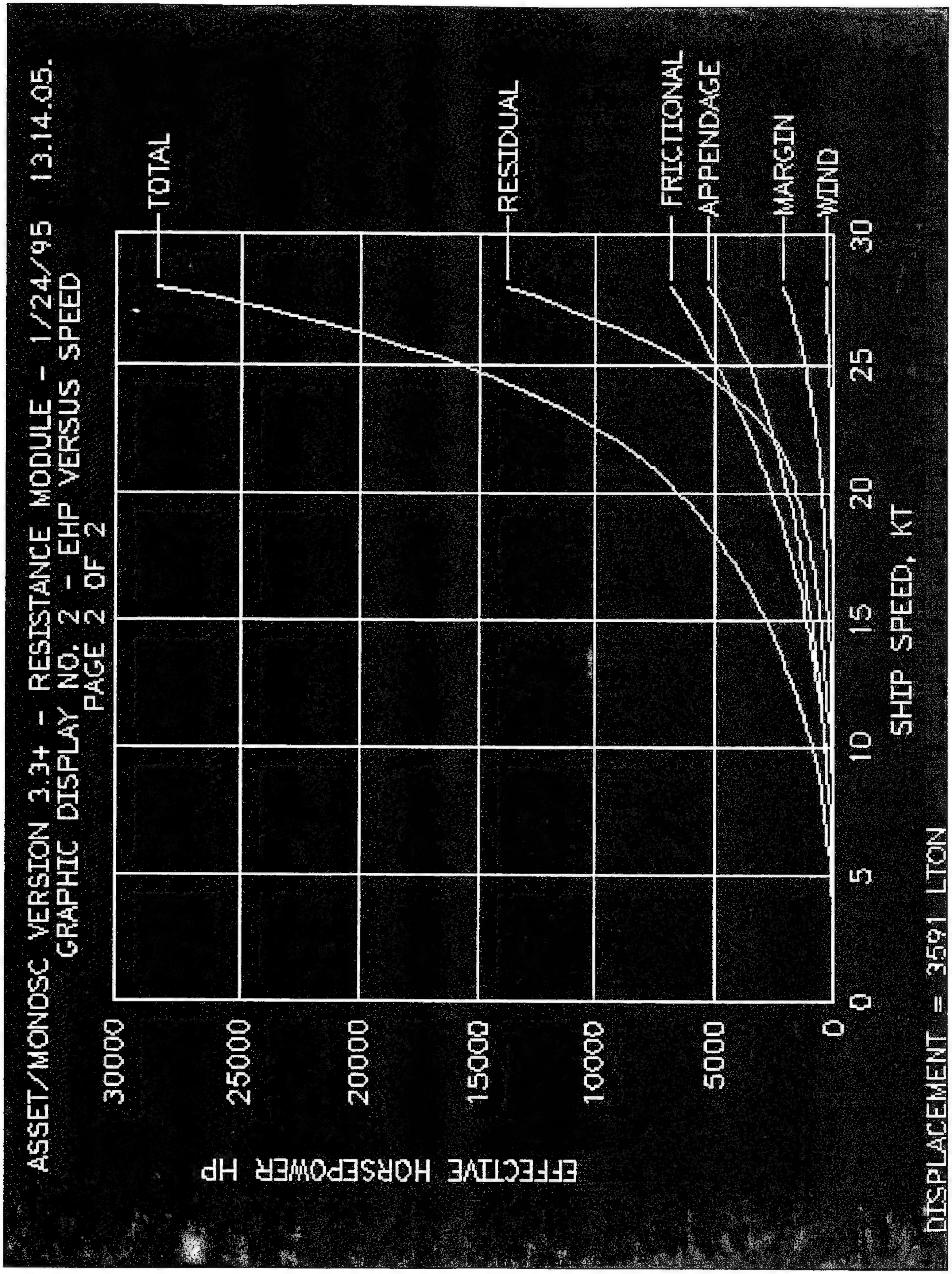

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 12.28.
GRAPHIC DISPLAY NO. 8 - TRANSPORT EFFICIENCY VERSUS SPEED
TRANSPORT EFFICIENCY
110
100
90
80
70
60
50
40
30
20
14
16
18
20
22
24
26
28
SHIP SPEED, KT

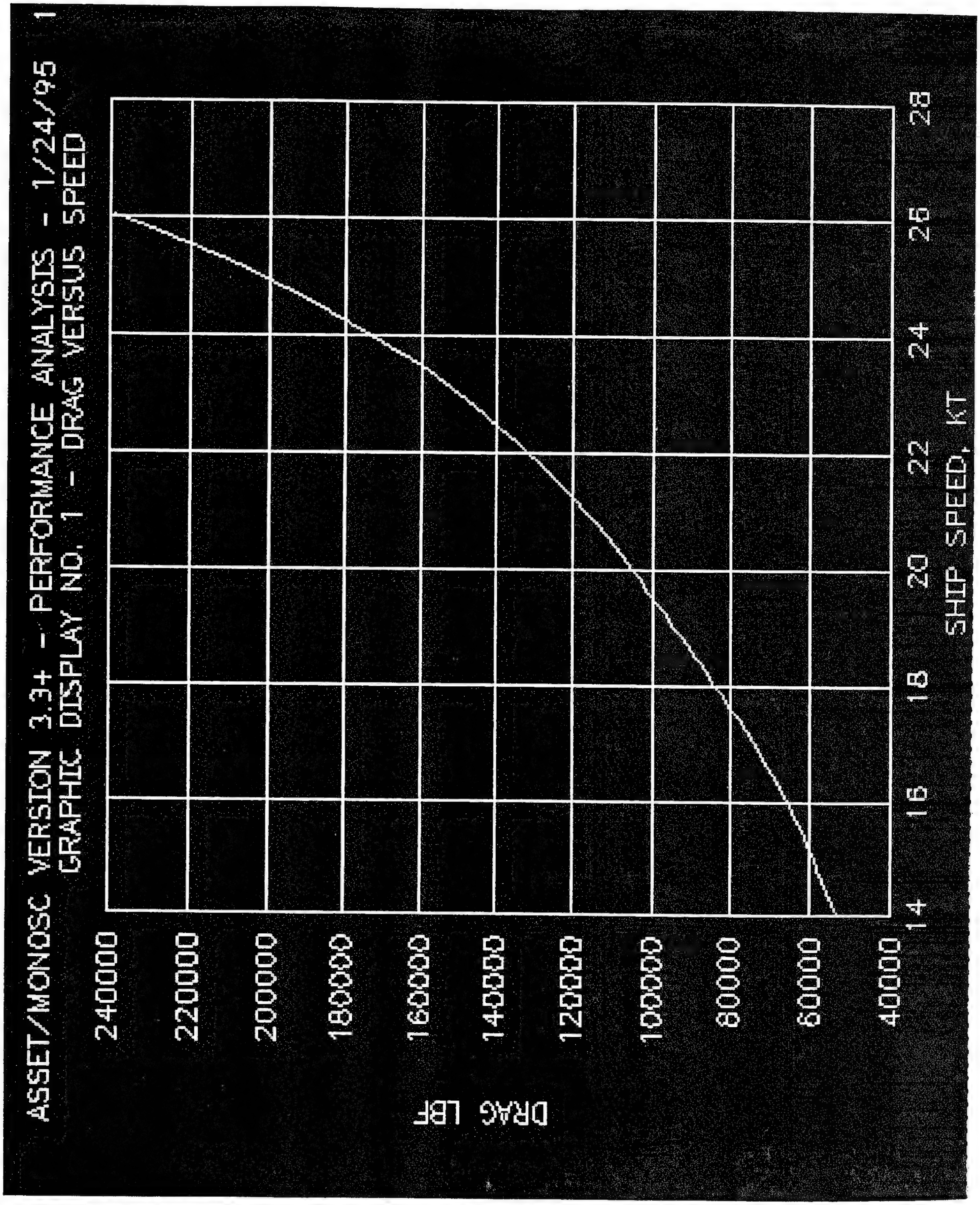

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 1/24/95 13.14.05.
GRAPHIC DISPLAY NO. 1 - RESISTANCE VERSUS SPEED
3813 LTON
3591 LTON
RESISTANCE LBF
350000
300000
250000
200000
150000
100000
50000
0
0
5
10
15
20
25
30
SHIP SPEED, KT

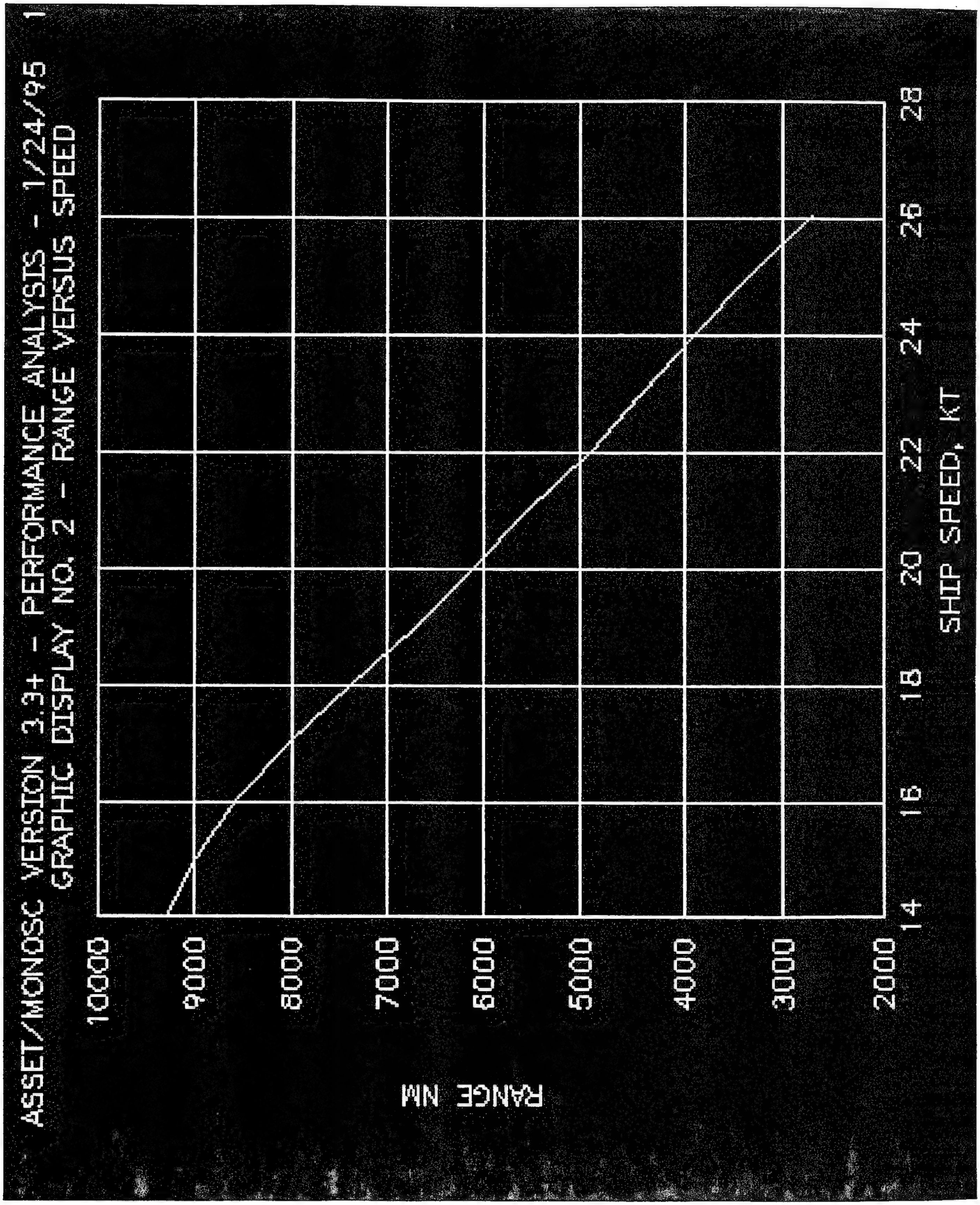
SECTION 3

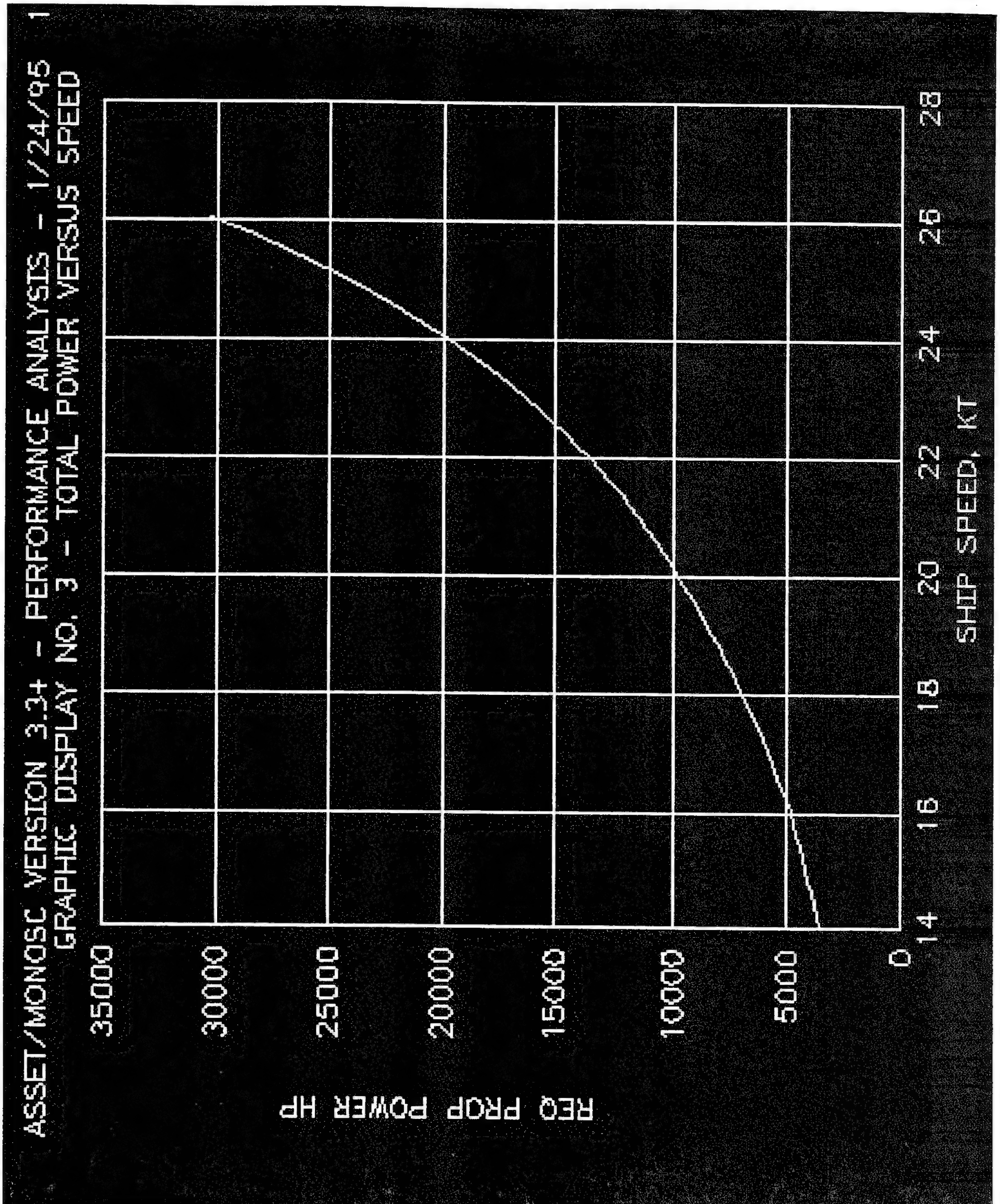
COAST GUARD VARIANT SPECIFIC REPORTS

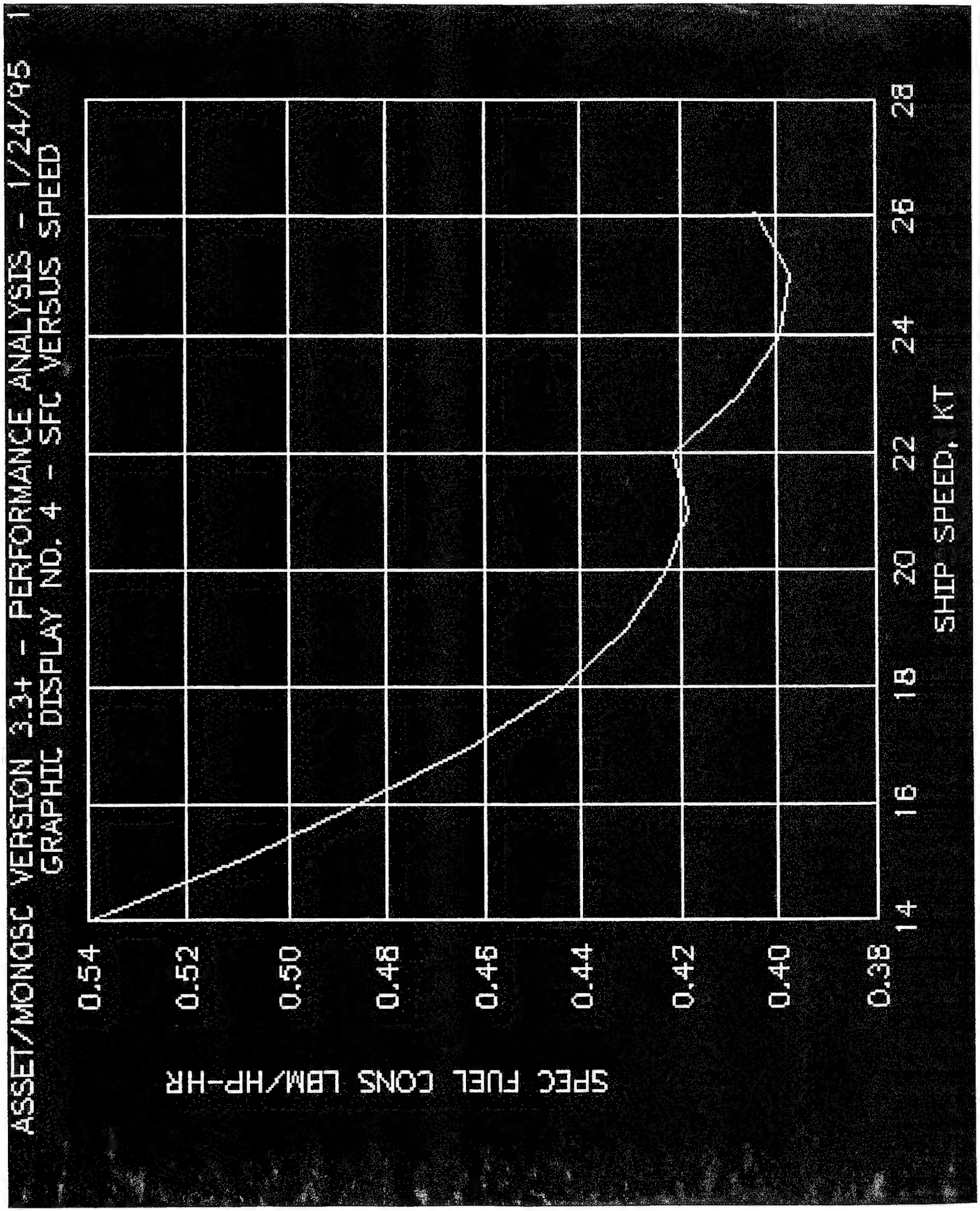

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 1/24/95 13.14.05.
GRAPHIC DISPLAY NO. 2 - EHP VERSUS SPEED
PAGE 1 OF 2
EFFECTIVE HORSEPOWER HP
30000
25000
20000
15000
10000
5000
0
0
5
10
15
20
25
30
SHIP SPEED, KT
TOTAL
RESIDUAL
FRICTIONAL
APPENDAGE
MARGIN
WIND
DISPLACEMENT = 3813 LTON

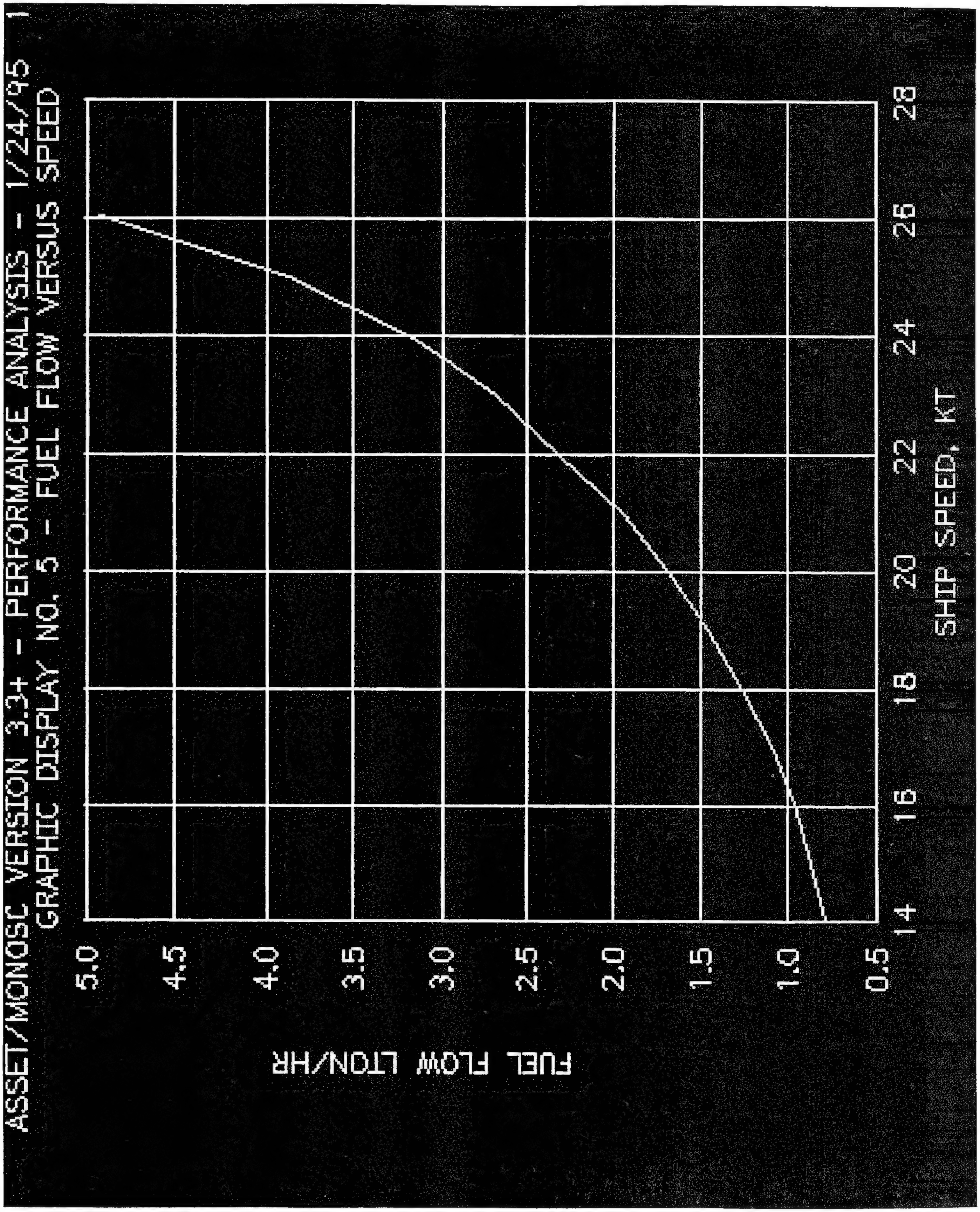

ASSET/MONOSC VERSION 3.3+ - RESISTANCE MODULE - 1/24/95 13.14.05.
GRAPHIC DISPLAY NO. 2 - EHP VERSUS SPEED
PAGE 2 OF 2
EFFECTIVE HORSEPOWER HP
30000
25000
20000
15000
10000
5000
0
0
5
10
15
20
25
30
SHIP SPEED, KT
TOTAL
RESIDUAL
FRICTIONAL
APPENDAGE
MARGIN
WIND
DISPLACEMENT = 3591 LTON

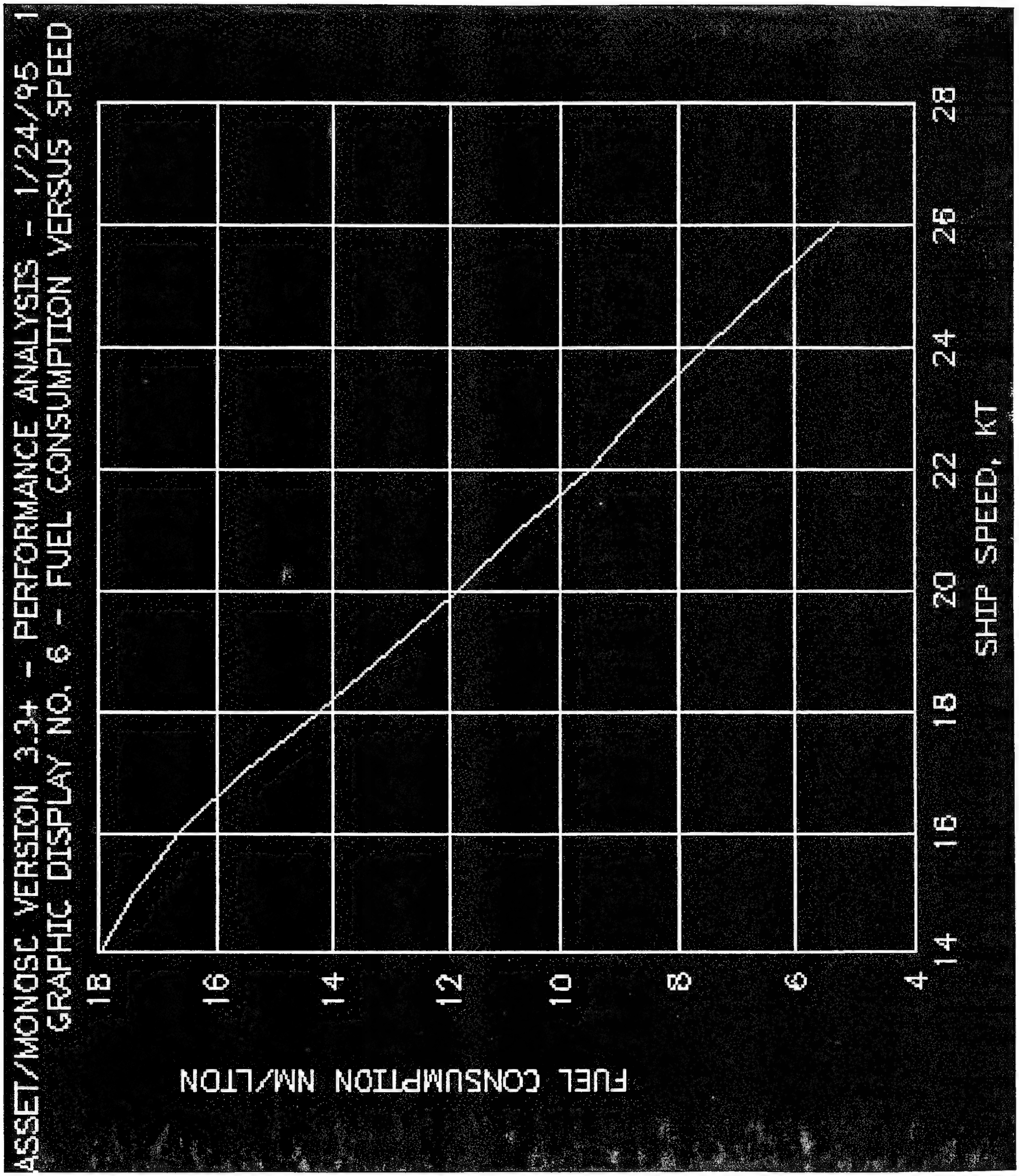

ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 1 - DRAG VERSUS SPEED
DRAG LBF
240000
220000
200000
180000
160000
140000
120000
100000
80000
60000
40000
14
16
18
20
22
24
26
28
SHIP SPEED, KT


ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 2 - RANGE VERSUS SPEED
RANGE NM
10000
9000
8000
7000
6000
5000
4000
3000
2000
SHIP SPEED, KT
14
16
18
20
22
24
26
28


ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 3 - TOTAL POWER VERSUS SPEED
REQ PROP POWER HP
35000
30000
25000
20000
15000
10000
5000
0
14
16
18
20
22
24
26
28
SHIP SPEED, KT


ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 - 1
GRAPHIC DISPLAY NO. 4 - SFC VERSUS SPEED
SPEC FUEL CONS LBM/HP-HR
0.54
0.52
0.50
0.48
0.46
0.44
0.42
0.40
0.38
14
16
18
20
22
24
26
28
SHIP SPEED, KT


ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 5 - FUEL FLOW VERSUS SPEED
FUEL FLOW LTON/HR
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
14
16
18
20
22
24
26
28
SHIP SPEED, KT


ASSET/MONOSC VERSION 3.3+ - PERFORMANCE ANALYSIS - 1/24/95 1
GRAPHIC DISPLAY NO. 6 - FUEL CONSUMPTION VERSUS SPEED
FUEL CONSUMPTION NM/LTON
18
16
14
12
10
8
6
4
SHIP SPEED, KT
14
16
18
20
22
24
26
28

APPENDIX P

NAVAL ARCHITECTURE DATA

SUMMARY

This appendix (P) contains the data calculated by GHS for developing the charts in the Naval Architecture section of this design report. All of the charts were generated by GHS, with the exception of the Floodable Length Curve which was generated using Microsoft Excel v5.0.

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GHS 6.38D CPCX

HYDROSTATIC PROPERTIES
Trim: Fwd 0.53 deg., No Heel, VCG = 20.21

LCF Draft	Displacement Weight(LT)	Buoyancy-Ctr. LCB	VCB	Weight/ Inch	LCF	Moment/ Deg trim	KML	KMT
2.000	122.52	133.89a	1.30	8.06	150.57a	4871.36	2298.0	23.36
4.000	403.64	151.72a	2.54	13.59	165.33a	9843.80	1417.3	28.74
6.000	801.76	161.05a	3.79	18.04	174.71a	15255	1110.2	29.58
8.000	1,300.48	168.02a	5.03	21.80	183.29a	21435	964.4	28.75
10.000	1,880.38	173.83a	6.26	24.98	190.39a	28010	873.6	27.62
12.000	2,539.82	179.11a	7.50	28.10	197.98a	36206	836.9	26.90
14.000	3,271.11	184.08a	8.74	30.94	205.07a	45324	814.0	26.33
16.000	4,076.32	189.02a	9.98	33.84	212.49a	57080	822.4	25.95
18.000	4,914.28	193.21a	11.18	35.43	213.40a	63191	756.9	25.60
20.000	5,773.68	196.12a	12.34	36.65	212.09a	67414	689.1	25.55
22.000	6,662.25	198.15a	13.50	37.96	210.50a	72092	640.1	25.84
24.000	7,581.86	199.54a	14.65	39.32	208.73a	77142	603.1	26.35
26.000	8,533.83	200.48a	15.81	40.66	207.02a	81946	570.3	27.00
28.000	9,516.36	201.05a	16.97	42.00	204.98a	87154	544.9	27.73
30.000	10,472.61	201.27a	18.06	32.37	194.51a	89239	508.4	25.36

Distances in FEET.-------Specific Gravity = 1.025.-----------Moment in Ft-LT.
Draft is from Baseline.

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GHS 6.38D

CPCX

CURVES OF FORM
HULL.C Component of Part HULL

Trim: zero Heel: zero

Ref Pt Depth	Volume (Cu Ft)	Block Coef	Displ/ Length	WaterPl Coef	MaxSect Coef	PrismaticCoefs Long	PrismaticCoefs Vert
2.00	4510	0.351	8.0	0.590	0.634	0.559	0.595
4.00	14368	0.358	18.7	0.604	0.656	0.549	0.593
6.00	28338	0.370	29.7	0.623	0.678	0.549	0.595
8.00	45795	0.389	40.0	0.649	0.708	0.551	0.600
10.00	66164	0.405	49.0	0.668	0.737	0.553	0.606
12.00	89265	0.418	56.3	0.687	0.759	0.555	0.609
14.00	115006	0.428	61.7	0.709	0.780	0.554	0.604
16.00	143062	0.456	74.2	0.733	0.796	0.576	0.622
18.00	172210	0.481	88.2	0.746	0.811	0.596	0.645
20.00	202311	0.501	102.3	0.760	0.821	0.613	0.660
22.00	233438	0.518	116.6	0.775	0.830	0.627	0.669
24.00	265644	0.534	131.0	0.791	0.836	0.640	0.675
26.00	298960	0.547	145.6	0.807	0.841	0.652	0.678
28.00	333366	0.559	160.3	0.823	0.845	0.664	0.681
30.00	364957	0.565	173.4	0.449	0.844	0.671	1.259

Distances in FEET.-----Length is true waterline.-----------------------

HULL Reference Point: Long.= 0.00 Trans.= 0.00 Vert.= 0.00

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GHS 6.38D CPCX

CROSS CURVES OF STABILITY
Showing righting arms in heel at VCG = 0.00

Trim: zero at zero heel (trim righting arm held at zero)

Displacement LONG TONS	Heel Angles in Degrees 10.00s	20.00s	30.00s	40.00s	50.00s	60.00s
128.83	5.10s	10.13s	13.75s	16.12s	17.76s	19.43s
410.42	5.31s	9.82s	13.30s	15.88s	18.04s	21.20s
809.51	5.22s	9.59s	13.03s	15.81s	18.48s	21.77s
1,308.16	5.06s	9.39s	12.91s	15.95s	19.06s	21.73s
1,890.03	4.89s	9.23s	12.91s	16.22s	19.39s	21.47s
2,549.92	4.75s	9.12s	12.99s	16.59s	19.45s	21.14s
3,285.22	4.65s	9.05s	13.13s	16.81s	19.33s	20.75s
4,086.67	4.57s	9.02s	13.31s	16.77s	19.01s	20.26s
4,919.31	4.50s	9.02s	13.31s	16.47s	18.53s	19.70s
5,779.16	4.48s	9.05s	13.09s	15.98s	17.94s	19.12s
6,668.31	4.52s	9.03s	12.66s	15.35s	17.28s	18.51s
7,588.33	4.60s	8.82s	12.08s	14.64s	16.57s	17.90s
8,540.00	4.65s	8.39s	11.39s	13.87s	15.84s	17.29s
9,522.85	4.36s	7.70s	10.59s	13.06s	15.11s	16.70s
10,425.27	3.62s	6.81s	9.71s	12.27s	14.43s	16.14s

Distances in FEET.--Specific Gravity = 1.025.---------------
Free surface ignored.

95-11-02 09:21:49
GHS/FL 1.54

CPCX

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C:\GHS\TS

FLOODABLE LENGTHS

Initial Origin Depth = 15.50 Initial Trim = 0.00 Degrees
Vertical C.G. = 19.74 Permeability =0.700

ORIGIN DEPTH	Deg TRIM	FLOODED CENTER	FLOODED LENGTH	MARGIN	GMt
37.02	-4.24	81.00	205.87	0.25	8.10
37.04	-4.21	90.00	192.84	0.25	8.19
37.07	-4.11	99.00	189.40	0.25	8.41
37.12	-3.99	108.00	190.75	0.25	8.66
37.17	-3.84	117.00	195.15	0.25	8.95
37.22	-3.67	126.00	201.96	0.25	9.26
37.24	-3.49	135.00	211.02	0.25	9.59
37.21	-3.28	144.00	221.57	0.25	9.82
37.10	-3.04	153.00	233.55	0.25	9.88
36.87	-2.75	162.00	247.24	0.25	9.90
36.46	-2.42	171.00	261.27	0.25	9.88
35.80	-2.03	180.00	274.32	0.25	9.78
34.77	-1.58	189.00	284.52	0.25	9.59
33.26	-1.06	198.00	289.66	0.25	9.25
31.20	-0.49	207.00	287.37	0.25	8.78
28.66	0.08	216.00	278.23	0.25	8.15
25.89	0.62	225.00	263.78	0.25	7.47
23.09	1.10	234.00	246.88	0.25	6.79
20.41	1.52	243.00	229.32	0.25	6.18
18.02	1.88	252.00	213.23	0.25	5.72
15.93	2.20	261.00	199.40	0.25	5.39
14.09	2.47	270.00	187.51	0.25	5.16
12.49	2.71	279.00	177.60	0.25	4.99
11.08	2.92	288.00	169.00	0.25	4.89
9.84	3.11	297.00	161.58	0.25	4.82
9.39	3.18	306.00	170.07	0.25	4.80

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5-10-31 13:51:59                                              Page 1
HS/FL 1.54                         CPCX                       C:\GHS\TS

                          FLOODABLE LENGTHS
      Initial Origin Depth =  15.50   Initial Trim =  0.00 Degrees
             Vertical C.G. =  19.74   Permeability =0.950
```

ORIGIN DEPTH	Deg TRIM	FLOODED CENTER	FLOODED LENGTH	MARGIN	GMt
36.85	-4.72	45.00	160.95	0.25	7.20
36.85	-4.72	54.00	142.97	0.25	7.20
36.86	-4.69	63.00	130.37	0.25	7.32
36.88	-4.61	72.00	124.30	0.25	7.51
36.92	-4.52	81.00	121.30	0.25	7.71
36.96	-4.41	90.00	120.69	0.25	7.93
37.01	-4.28	99.00	121.56	0.25	8.16
37.06	-4.14	108.00	123.84	0.25	8.44
37.12	-3.98	117.00	127.48	0.25	8.75
37.18	-3.81	126.00	132.30	0.25	9.12
37.24	-3.61	135.00	138.29	0.25	9.54
37.24	-3.40	144.00	145.09	0.25	9.95
37.17	-3.16	153.00	152.86	0.25	10.27
36.97	-2.86	162.00	161.31	0.25	10.51
36.59	-2.51	171.00	169.98	0.25	10.72
35.92	-2.09	180.00	178.22	0.25	10.83
34.84	-1.61	189.00	184.70	0.25	10.75
33.23	-1.05	198.00	188.30	0.25	10.40
31.04	-0.45	207.00	187.84	0.25	9.79
28.37	0.14	216.00	183.42	0.25	8.97
25.45	0.70	225.00	175.72	0.25	8.09
22.53	1.19	234.00	165.89	0.25	7.24
19.82	1.61	243.00	155.43	0.25	6.51
17.43	1.97	252.00	145.86	0.25	5.96
15.36	2.28	261.00	137.56	0.25	5.56
13.58	2.55	270.00	130.42	0.25	5.25
12.02	2.78	279.00	124.32	0.25	5.03
10.67	2.99	288.00	119.10	0.25	4.87
9.47	3.17	297.00	114.49	0.25	4.75
8.43	3.32	306.00	110.74	0.25	4.67
7.49	3.46	315.00	107.53	0.25	4.63
6.66	3.59	324.00	104.90	0.25	4.61
6.31	3.64	333.00	113.72	0.25	4.62

nvalid command

RIGHTING ARMS vs HEEL ANGLE

Fixed CG: LCG = 187.01a TCG = 0.00 VCG = 20.21

Origin Depth	Degrees of Trim	Degrees of Heel	Displacement Weight(LT)	Righting Arms in Trim	Righting Arms in Heel
17.790	0.53f	0.00	4,001.58	0.02f	0.000
17.737	0.54f	5.00s	4,001.09	0.00	0.674s
17.581	0.58f	10.00s	4,001.98	0.02f	1.350s
17.273	0.62f	15.00s	4,001.34	0.00	2.022s
16.818	0.69f	20.00s	4,001.31	0.00	2.696s
16.189	0.76f	25.00s	4,001.34	0.00	3.379s
15.356	0.84f	30.00s	4,001.35	0.00	4.079s
14.362	0.92f	35.00s	4,001.32	0.00	4.663s
13.270	1.00f	40.00s	4,001.32	0.00	5.007s
12.090	1.08f	45.00s	4,001.34	0.00	5.135s
11.809	1.09f	46.10s	4,001.35	0.04a	5.140s
10.819	1.14f	50.00s	4,001.35	0.00	5.087s
9.464	1.19f	55.00s	4,001.35	0.00	4.892s
8.043	1.23f	60.00s	4,001.36	0.00	4.579s

Distances in FEET.--Specific Gravity = 1.025.----------

Note: The Center of Gravity shown above is for the Fixed Weight of 3439.07 LT. As the tank load centers shift with heel and trim, the total Center of Gravity varies. The righting arms shown above include the effect of the C.G. variation.

WAVE DESCRIPTION

Wave type: TROCHOID
Phase of crest relative to origin: 0.0 degrees (0.00 Ft)
Wave length: 380.00 Ft Crest-to-trough height: 21.44 Ft

LONGITUDINAL STRENGTH

LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
18.36f	0.00			
18.36f	0.01		-0.0	0
18.00f	0.03		-0.0	1
18.00f	0.07		-0.0	1
15.12f	0.17	0.00	-0.4	5
9.18f	0.39	0.95	0.8	15
0.00	0.88	3.84	17.0	-37
0.00	0.93	3.84	17.0	-37
6.50a	1.71	5.68	39.3	-207
6.50a	2.04	5.68	39.3	-207
13.00a	2.81	7.35	65.9	-536
15.00a		7.80	75.4	-674
15.00a	24.09*	7.80	51.3	-674
18.80a	2.95	8.64	71.5	-901
18.80a	2.18	8.64	71.5	-901
22.57a	2.13	9.48	97.5	-1,213
25.00a		9.91	115.7	-1,469
25.00a	5.05*	9.91	110.7	-1,469
27.02a	2.37	10.27	126.4	-1,704
32.13a	2.62	11.18	168.5	-2,450
41.69a	3.06	12.44	254.2	-4,450
42.50a	3.10	12.51	261.8	-4,657
42.50a	3.16	12.51	261.8	-4,657
50.08a	3.55	13.21	333.9	-6,902
51.25a	3.60	13.32	345.2	-7,298
54.00a		13.48	372.0	-8,280
54.00a	9.80*	13.48	362.2	-8,280
55.00a		13.54	372.0	-8,646
55.00a	26.39*	13.54	345.6	-8,646
60.81a	4.03	13.87	402.5	-10,810
65.50a	4.21	13.98	448.5	-12,799
65.50a	4.37	13.98	448.5	-12,800
68.00a	4.50	14.04	472.4	-13,947
68.00a	12.35	14.04	472.4	-13,947
70.38a	12.47	14.10	476.4	-15,073
73.40a	12.62	14.10	481.1	-16,514
79.94a	12.90	14.10	489.8	-19,681
88.00a	14.08	13.93	494.1	-23,641
88.00a	6.23	13.93	494.1	-23,642
88.50a	6.31	13.92	497.9	-23,889

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LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
88.50a	5.78	13.92	497.9	-23,889
89.50a	5.94	13.89	505.9	-24,389
90.00a	5.98	13.87	509.9	-24,642
90.00a	6.85	13.87	509.9	-24,643
91.00a	6.94	13.83	516.9	-25,154
91.00a	8.37	13.83	516.9	-25,154
92.00a		13.79	522.3	-25,672
92.00a	2.00*	13.79	520.3	-25,673
95.00a		13.67	535.6	-27,252
95.00a	6.10*	13.67	529.6	-27,252
98.46a	9.04	13.53	545.8	-29,106
98.50a	9.05	13.53	546.0	-29,130
98.50a	9.74	13.53	546.0	-29,130
99.07a	9.79	13.50	548.1	-29,438
99.07a	9.79	13.50	548.2	-29,441
103.00a		13.29	560.1	-31,615
103.00a	8.10*	13.29	552.0	-31,615
106.00a		13.13	557.6	-33,276
106.00a	5.00*	13.13	552.6	-33,276
108.00a	12.36	13.02	554.6	-34,380
108.00a	11.60	13.02	544.4	-34,380
108.00a		13.02	544.4	-34,380
108.00a	10.20*	13.02	544.4	-34,380
108.63a	11.78	12.99	545.2	-34,722
112.10a	11.88	12.75	548.8	-36,616
112.10a	12.01	12.75	548.8	-36,616
113.00a	12.05	12.68	549.4	-37,109
113.00a	11.45	12.68	549.4	-37,109
114.00a		12.61	550.6	-37,657
114.00a	0.70*	12.61	549.9	-37,658
115.00a	11.54	12.55	551.0	-38,206
115.00a	12.74	12.55	548.9	-38,207
115.00a		12.55	548.9	-38,207
115.00a	2.10*	12.55	548.9	-38,207
117.00a	12.83	12.41	548.3	-39,301
117.00a	13.02	12.41	548.3	-39,301
117.35a	13.03	12.38	548.0	-39,493
118.19a	13.06	12.33	547.5	-39,951
120.00a		12.19	546.0	-40,938
120.00a	3.15*	12.19	542.8	-40,938
123.00a		11.97	539.6	-42,557
123.00a	4.30*	11.97	533.0	-42,558
123.00a		11.97	539.6	-42,557
123.00a	2.30*	11.97	533.0	-42,558
126.00a		11.74	528.8	-44,146
126.00a	4.00*	11.74	524.8	-44,146
127.08a	13.33	11.66	523.0	-44,712
127.75a	13.34	11.61	521.9	-45,059
130.00a	13.38	11.43	517.8	-46,226

CPCX

LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
130.00a	12.18	11.43	517.8	-46,226
135.70a	12.29	10.96	511.8	-49,153
135.70a	12.56	10.96	511.8	-49,153
136.45a	12.59	10.90	510.6	-49,536
136.45a	18.97	10.90	510.6	-49,536
136.50a	18.97	10.90	510.2	-49,561
136.50a	18.76	10.90	510.2	-49,561
137.00a		10.86	506.2	-49,814
137.00a	10.00*	10.86	496.2	-49,815
137.32a	18.79	10.83	493.7	-49,970
146.88a	19.13	10.06	412.3	-54,298
147.03a	19.13	10.04	410.9	-54,359
152.00a		9.66	364.6	-56,280
152.00a	15.54*	9.66	349.1	-56,280
153.00a		9.58	339.5	-56,623
153.00a	1.00*	9.58	338.5	-56,623
156.33a	19.28	9.32	305.8	-57,691
156.44a	19.28	9.32	304.7	-57,725
166.00a	19.29	8.65	206.2	-60,158
170.24a	18.79	8.40	161.6	-60,932
170.24a	19.21	8.40	161.6	-60,932
171.97a	19.05	8.29	143.0	-61,193
171.97a	12.67	8.29	143.0	-61,193
172.00a	12.67	8.29	142.8	-61,197
172.00a	12.92	8.29	142.8	-61,197
175.00a	12.64	8.11	129.1	-61,600
175.00a	13.10	8.11	129.1	-61,600
175.57a	13.04	8.08	126.3	-61,672
175.57a	13.04	8.08	126.3	-61,672
177.77a	12.97	7.98	115.3	-61,935
180.00a		7.88	104.2	-62,176
180.00a	4.10*	7.88	100.1	-62,176
184.83a	12.64	7.66	76.0	-62,595
185.13a	12.63	7.65	74.5	-62,617
191.00a		7.47	45.9	-62,961
191.00a	45.78*	7.47	0.1	-62,961
194.69a	12.02	7.36	-17.3	-62,924
195.00a		7.36	-18.7	-62,918
195.00a	3.30*	7.36	-22.0	-62,918
198.00a		7.32	-35.9	-62,827
198.00a	1.90*	7.32	-37.8	-62,827
199.40a	11.88	7.30	-44.2	-62,768
199.40a	12.12	7.30	-44.2	-62,768
200.00a		7.29	-47.1	-62,739
200.00a	4.30*	7.29	-51.4	-62,739
201.00a	12.11	7.27	-56.3	-62,684
201.00a	11.75	7.27	-56.3	-62,684
202.00a	11.74	7.26	-60.7	-62,624
202.00a	12.19	7.26	-60.7	-62,624

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LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
204.25a	12.17	7.23	-71.9	-62,472
205.00a	12.09	7.23	-75.5	-62,415
205.00a	11.63	7.23	-75.5	-62,415
207.48a	11.37	7.22	-86.1	-62,211
212.00a		7.22	-103.6	-61,775
212.00a	3.15*	7.22	-106.8	-61,775
213.90a	10.60	7.22	-113.4	-61,562
215.00a	10.46	7.22	-117.1	-61,434
215.00a	11.36	7.22	-119.6	-61,434
215.00a		7.22	-119.6	-61,434
215.00a	2.50*	7.22	-119.6	-61,434
215.24a	11.33	7.22	-120.5	-61,406
215.24a	11.33	7.22	-120.6	-61,405
216.00a		7.23	-123.7	-61,311
216.00a	4.10*	7.23	-127.8	-61,311
222.00a		7.32	-151.0	-60,465
222.00a	29.99*	7.32	-181.0	-60,465
225.00a		7.36	-191.9	-59,901
225.00a	3.20*	7.36	-195.1	-59,901
226.22a	10.83	7.38	-199.3	-59,659
228.90a	10.76	7.45	-208.4	-59,109
228.90a	11.28	7.45	-208.4	-59,108
230.00a	11.27	7.47	-212.6	-58,875
230.00a	9.91	7.47	-212.6	-58,875
230.50a	9.91	7.49	-213.8	-58,768
230.50a	16.28	7.49	-213.8	-58,768
237.21a	16.23	7.65	-272.0	-57,129
241.00a		7.80	-304.2	-56,030
241.00a	36.49*	7.80	-340.7	-56,029
244.37a	16.12	7.93	-368.6	-54,829
247.63a	16.02	8.05	-394.9	-53,580
248.00a		8.07	-397.9	-53,433
248.00a	15.54*	8.07	-413.4	-53,433
248.19a	16.00	8.07	-414.9	-53,354
250.00a		8.16	-429.0	-52,587
250.00a	4.10*	8.16	-433.1	-52,587
259.17a	14.47	8.58	-494.9	-48,307
259.17a	14.47	8.59	-494.9	-48,304
264.32a	14.86	8.88	-525.5	-45,672
264.32a	14.22	8.88	-525.5	-45,672
266.00a	14.44	8.97	-534.6	-44,779
266.00a	8.06	8.97	-534.6	-44,779
266.32a	8.10	8.99	-534.3	-44,608
266.32a	12.90	8.99	-534.3	-44,608
268.89a	13.01	9.14	-544.3	-43,219
270.00a	13.04	9.20	-548.6	-42,610
270.00a	13.50	9.20	-553.6	-42,610
270.00a		9.20	-553.6	-42,610
270.00a	5.00*	9.20	-553.6	-42,610

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LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
270.16a	13.50	9.21	-554.2	-42,521
275.00a		9.51	-572.8	-39,785
275.00a	9.60*	9.51	-582.4	-39,785
277.70a	12.57	9.68	-590.9	-38,198
281.14a	12.11	9.89	-599.7	-36,143
281.14a	12.11	9.89	-599.7	-36,140
288.00a		10.35	-606.7	-31,986
288.00a	6.10*	10.35	-612.8	-31,986
291.07a	9.28	10.56	-610.5	-30,102
292.13a	9.01	10.63	-609.0	-29,455
294.50a	8.50	10.78	-604.4	-28,013
294.50a	9.55	10.78	-604.4	-28,013
297.00a	9.02	10.94	-600.4	-26,503
297.00a	8.11	10.94	-600.4	-26,503
300.00a		11.14	-590.7	-24,712
300.00a	5.00*	11.14	-595.7	-24,711
300.77a	7.32	11.19	-592.8	-24,255
303.11a	6.79	11.34	-582.9	-22,874
314.09a	5.80	11.99	-524.0	-16,764
323.00a	5.04	12.38	-463.8	-12,342
323.00a	4.89	12.38	-463.8	-12,342
323.30a	4.87	12.40	-461.5	-12,203
323.30a	3.56	12.40	-461.5	-12,203
324.00a	3.54	12.43	-455.3	-11,881
324.00a	3.36	12.43	-455.3	-11,881
325.08a	3.33	12.48	-445.5	-11,395
336.06a	3.11	12.76	-342.3	-7,047
347.05a	2.89	12.69	-235.5	-3,856
358.03a	2.68	12.23	-129.2	-1,839
360.00a		12.07	-110.5	-1,600
360.00a	56.78*	12.07	-167.3	-1,600
369.02a	2.49	11.32	-85.1	-453
378.00a		10.16	-10.3	-18
378.00a	5.05*	10.16	-15.4	-18
380.00a	2.32	9.90	-0.0	-0
380.00a	0.00			

* Point weight in LONG TONS------------------------------

S U M M A R Y

Largest Shear: -612.8 LT at 288.00a
Largest Bending Moment: -62,961 LT-Ft at 191.00a (Sagging)

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WAVE DESCRIPTION

Wave type: TROCHOID
Phase of crest relative to origin: 180.0 degrees (190.00 Ft)
Wave length: 380.00 Ft Crest-to-trough height: 21.44 Ft

LONGITUDINAL STRENGTH

LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
18.36f	0.00			
18.36f	0.01		-0.0	0
18.00f	0.03		-0.0	0
18.00f	0.07		-0.0	0
9.18f	0.39		-2.0	9
0.00	0.88		-7.9	54
0.00	0.93		-7.9	54
6.50a	1.71		-16.5	132
6.50a	2.04		-16.5	132
8.72a	2.30	0.00	-21.3	175
13.00a	2.81	0.09	-32.0	289
15.00a		0.12	-37.4	359
15.00a	24.10*	0.12	-61.5	359
18.80a	2.96	0.16	-72.1	614
18.80a	2.18	0.16	-72.1	614
22.57a	2.12	0.20	-79.5	900
25.00a		0.24	-84.3	1,100
25.00a	5.05*	0.24	-89.3	1,100
32.13a	2.62	0.36	-104.6	1,793
41.69a	3.09	0.57	-127.4	2,902
42.50a	3.13	0.60	-129.5	3,007
42.50a	3.14	0.60	-129.5	3,007
51.25a	3.58	0.94	-152.1	4,240
54.00a		1.10	-159.4	4,670
54.00a	9.80*	1.10	-169.2	4,670
55.00a		1.16	-171.8	4,840
55.00a	26.40*	1.16	-198.2	4,840
60.81a	4.06	1.51	-213.1	6,037
65.50a	4.27	1.92	-224.6	7,065
65.50a	4.35	1.92	-224.6	7,065
68.00a	4.47	2.13	-230.6	7,635
68.00a	12.32	2.13	-230.6	7,635
70.38a	12.43	2.34	-254.7	8,213
79.94a	12.91	3.54	-347.7	11,101
88.00a	14.17	4.90	-422.8	14,209
88.00a	6.32	4.90	-422.8	14,209
88.50a	6.40	4.99	-423.5	14,421
88.50a	5.76	4.99	-423.5	14,421
89.50a	5.92	5.15	-424.3	14,845
90.00a	5.96	5.26	-424.7	15,057

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LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
90.00a	6.84	5.26	-424.7	15,057
91.00a	6.92	5.47	-426.2	15,483
91.00a	8.35	5.47	-426.2	15,483
92.00a		5.69	-429.0	15,911
92.00a	2.00*	5.69	-431.0	15,911
95.00a		6.33	-438.7	17,217
95.00a	6.10*	6.33	-444.8	17,217
98.50a	9.02	7.07	-452.4	18,788
98.50a	9.69	7.07	-452.4	18,788
99.07a	9.74	7.20	-453.8	19,044
99.07a	9.74	7.20	-453.8	19,047
103.00a		8.22	-464.1	20,851
103.00a	8.10*	8.22	-472.2	20,851
106.00a		8.99	-480.5	22,281
106.00a	5.00*	8.99	-485.5	22,281
108.00a	12.41	9.51	-491.2	23,258
108.00a	11.65	9.51	-501.4	23,258
108.00a		9.51	-501.4	23,258
108.00a	10.20*	9.51	-501.4	23,258
108.63a	11.84	9.68	-502.8	23,575
112.10a	11.98	10.69	-508.8	25,332
112.10a	11.95	10.69	-508.8	25,332
113.00a	11.99	10.95	-509.8	25,790
113.00a	11.39	10.95	-509.8	25,791
114.00a		11.24	-510.2	26,301
114.00a	0.70*	11.24	-510.9	26,301
115.00a	11.48	11.53	-510.9	26,812
115.00a	12.68	11.53	-513.0	26,812
115.00a		11.53	-513.0	26,812
115.00a	2.10*	11.53	-513.0	26,812
117.00a	12.76	12.12	-514.8	27,841
117.00a	12.95	12.12	-514.8	27,841
118.19a	13.00	12.47	-515.6	28,454
120.00a		13.04	-516.1	29,388
120.00a	3.15*	13.04	-519.3	29,388
123.00a		14.00	-518.1	30,946
123.00a	4.30*	14.00	-524.7	30,946
123.00a		14.00	-518.1	30,946
123.00a	2.30*	14.00	-524.7	30,946
126.00a		14.96	-521.0	32,516
126.00a	4.00*	14.96	-525.0	32,516
127.75a	13.37	15.52	-521.6	33,432
130.00a	13.45	16.26	-516.1	34,600
130.00a	12.25	16.26	-516.0	34,600
135.70a	12.44	18.12	-488.4	37,469
135.70a	12.50	18.12	-488.4	37,469
136.45a	12.53	18.37	-484.1	37,834
136.45a	18.91	18.37	-484.1	37,834
136.50a	18.91	18.38	-484.2	37,858

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LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
136.50a	18.70	18.38	-484.2	37,858
137.00a		18.55	-484.3	38,101
137.00a	10.00*	18.55	-494.3	38,101
137.32a	18.73	18.65	-494.3	38,256
146.88a	19.04	21.71	-481.9	42,949
152.00a		23.21	-464.7	45,376
152.00a	15.55*	23.21	-480.3	45,377
153.00a		23.50	-476.1	45,855
153.00a	1.00*	23.50	-477.1	45,855
156.44a	19.27	24.50	-460.7	47,470
166.00a	19.45	26.85	-400.3	51,604
170.24a	19.03	27.62	-366.4	53,233
170.24a	19.13	27.62	-366.4	53,233
171.97a	18.97	27.93	-351.3	53,854
171.97a	12.59	27.93	-351.3	53,854
172.00a	12.58	27.94	-350.9	53,865
172.00a	12.83	27.94	-350.9	53,865
175.00a	12.54	28.48	-304.3	54,849
175.00a	13.00	28.48	-304.3	54,849
175.57a	12.95	28.59	-295.5	55,018
175.57a	12.95	28.59	-295.4	55,020
180.00a		29.06	-224.7	56,174
180.00a	4.10*	29.06	-228.8	56,174
185.13a	12.59	29.61	-143.4	57,132
191.00a		29.75	-42.3	57,680
191.00a	45.80*	29.75	-88.1	57,680
194.69a	12.16	29.83	-23.3	57,887
195.00a		29.82	-17.9	57,893
195.00a	3.30*	29.82	-21.2	57,893
198.00a		29.63	31.6	57,878
198.00a	1.90*	29.63	29.7	57,878
199.40a	12.12	29.55	54.1	57,820
199.40a	12.05	29.55	54.1	57,820
200.00a		29.51	64.6	57,784
200.00a	4.30*	29.51	60.3	57,784
201.00a	12.03	29.45	77.8	57,716
201.00a	11.67	29.45	77.8	57,716
202.00a	11.67	29.39	95.5	57,629
202.00a	12.11	29.39	95.5	57,629
204.25a	12.09	29.26	134.3	57,371
205.00a	12.00	29.15	147.2	57,266
205.00a	11.54	29.15	147.2	57,266
212.00a		28.12	269.5	55,808
212.00a	3.15*	28.12	266.4	55,808
215.00a	10.43	27.68	318.3	54,932
215.00a	11.33	27.68	315.8	54,932
215.00a		27.68	315.8	54,932
215.00a	2.50*	27.68	315.8	54,932
215.24a	11.31	27.65	319.6	54,858

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GHS 6.38D CPCX

LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
215.24a	11.31	27.65	319.7	54,856
216.00a		27.48	332.1	54,609
216.00a	4.10*	27.48	328.0	54,609
222.00a		26.13	421.6	52,358
222.00a	30.00*	26.13	391.6	52,358
225.00a		25.46	435.7	51,118
225.00a	3.20*	25.46	432.5	51,117
226.22a	10.99	25.18	450.0	50,579
228.90a	10.97	24.40	487.0	49,324
228.90a	11.25	24.40	487.0	49,324
229.44a	11.24	24.25	494.1	49,057
230.00a	11.24	24.08	501.3	48,781
230.00a	9.88	24.08	501.3	48,781
230.50a	9.87	23.94	508.4	48,529
230.50a	16.25	23.94	508.4	48,529
237.21a	16.17	21.99	553.7	44,963
241.00a		20.74	573.5	42,824
241.00a	36.50*	20.74	537.0	42,824
248.00a		18.42	561.8	38,971
248.00a	15.55*	18.42	546.2	38,971
248.19a	15.97	18.36	546.7	38,867
250.00a		17.71	550.6	37,875
250.00a	4.10*	17.71	546.5	37,874
259.17a	14.59	14.43	554.8	32,812
259.17a	14.59	14.43	554.8	32,810
264.32a	15.04	12.57	548.1	29,969
264.32a	14.22	12.57	548.1	29,969
266.00a	14.44	11.96	544.6	29,051
266.00a	8.06	11.96	544.6	29,051
266.32a	8.10	11.84	545.8	28,877
266.32a	12.76	11.84	545.8	28,877
270.00a	12.90	10.51	539.7	26,879
270.00a	13.36	10.51	534.7	26,879
270.00a		10.51	534.7	26,879
270.00a	5.00*	10.51	534.7	26,879
270.16a	13.36	10.46	534.3	26,793
275.00a		8.78	517.5	24,247
275.00a	9.60*	8.78	507.9	24,247
281.14a	12.13	6.64	478.6	21,216
281.14a	12.13	6.64	478.5	21,214
288.00a		4.55	440.1	18,066
288.00a	6.10*	4.55	434.0	18,066
292.13a	9.16	3.29	410.1	16,324
293.36a	8.89	3.01	402.8	15,823
294.50a	8.66	2.75	396.1	15,369
294.50a	9.46	2.75	396.1	15,369
297.00a	8.93	2.18	379.3	14,401
297.00a	8.01	2.18	379.3	14,401
300.00a		1.50	361.7	13,290

CPCX

LOCATION Ft	WEIGHT LT/Ft	BUOYANCY LT/Ft	SHEAR LT	MOMENT LT-Ft
300.00a	5.00*	1.50	356.7	13,290
303.11a	6.72	0.79	338.4	12,210
311.26a	6.08	0.00	289.4	9,654
314.09a	5.86		272.5	8,859
323.00a	5.19		223.3	6,657
323.00a	5.04		223.3	6,657
323.30a	5.02		221.8	6,590
323.30a	3.56		221.8	6,590
324.00a	3.54		219.3	6,436
324.00a	3.36		219.3	6,436
325.08a	3.34		215.7	6,202
336.06a	3.11		180.3	4,033
347.05a	2.89		147.3	2,239
358.03a	2.68		116.7	795
360.00a			111.4	570
360.00a	56.80*		54.6	570
369.02a	2.49		31.5	186
378.00a			9.7	4
378.00a	5.05*		4.7	4
380.00a	2.32		-0.0	0
380.00a	0.00			

* Point weight in LONG TONS

S U M M A R Y

Largest Shear: 573.5 LT at 241.00a
Largest Bending Moment: 57,893 LT-Ft at 195.00a (Hogging)

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